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From: U.S. Naval Forces, Germany, Office of the Senior U. S. Naval Liaison Officer, EUCOM Hq. Attn.: Technical Section (Medical) APO 403

To: Chief of the Bureau of Medicine and Surgery, Department of the Navy,

Via: (1) Technical Officer, U.S.Naval Forces, Germany
(2) Chief of Naval Operations (Op-32-F2)

Subject: Indexes - Geographical and General - for Atlas of Epidemiology - Forwarding of.

Reference: (a) Ltr. from this off. dtd.15 Dec.1948, File P 3-1(c), Serial 254-Med, to Chief, BUMED,
(b) Ltr. from this off. dtd.21 Feb.1949, File P 3-1(c), Serial 260-Med, to Chief, BUMED.

Enclosures: (A) Author Index to the Atlas of Epidemiology prepared by the Hygienists of the former German Armed Forces,
(B) General Subject Index to the Atlas of Epidemiology prepared by the Hygienists of the former German Armed Forces,
(C) Geographic Index to the Atlas of Epidemiology prepared by the Hygienists of the former German Armed Forces.

1. By references (a) and (b) translations of the Atlas of Epidemiology and introductory articles which subsequently became available were forwarded to various addressees.

2. The Atlas referred to is now in the process of further development into a world atlas. In this connection detailed cross reference/indexes of the material in the Atlas were compiled for use in the future project.

3. As the card index developed it became evident that it made accessible information otherwise more or less buried in the mass of the text of the Atlas. For that reason the card index has been placed on pages and is forwarded herewith as enclosures (A), (B) and (C). It is believed that this will make a more accessible and useful work of the translation of the Atlas.

N. W. Abrahams
N. W. ABRAHAMS,
Captain, U.S.N.
Senior U. S. Naval Liaison Officer

cc:
(see page 2)

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(1)

Project 3, Folio 1

FOREWORD

by

Dr. Handloser, General, MC,
Chief Commanding Officer of
the Medical Service of the
Armed Forces

Translation prepared by:
U.S.Fleet, U. S. Naval Forces, Germany
Technical Section (Medical)

INTRODUCTION

by

Dr. Zeiss, Colonel, M.C.
Consultant Epidemiologist
on the Staff of the Chief
Commanding Officer of the
Medical Service of the Army.

Translation prepared by:
U.S.Fleet, U.S. Naval Forces, Germany,
Technical Section (Medical).

In no previous war during the entire history of Germany and the German people have soldiers been required to fight in such varied climates and countries of the earth as during the present war. As a result the diseases occurring in the countries occupied are great in number and therefore all the more important and dangerous for German troops. If one is to take precautionary measures against these endemic or epidemic diseases, to control and if possible to extinguish them, it is necessary to know their "area of incidence". This Atlas of Epidemiology is compiled to provide the information required. The medico-geographic maps exhibit the picture of static conditions. Its geographical and medical, or geo-medical maps, show the picture of the dynamic progress of disease. By the closest cooperation of the Military Medical Academy and the Institute of Hygiene of the University of Berlin, the Atlas of Epidemiology has been completed. It will be a valuable contribution of medicine to strategic warfare. Simultaneously it is a most promising inauguration of a new branch of research for German and European Epidemiologists.

The exigencies of war prevent the Atlas from being made available to the general public at the moment. Therefore it is only intended to distribute it among the military circles and the German Universities, which are to employ it for the training of the medical students with regard to their future duties in the Armed Forces.

DR. HANDLOSER,
General, M.C.
Chief Commanding Officer of the
Medical Service of the Armed
Forces.

Headquarters of the
Army, Autumn 1942.

Knowledge of the medical topography and the medical geography of an area or a country is just as important for the final development or the final outcome of a battle as is knowledge of its physical geography. The soil, the vegetation, the animals and men living in it, that means the entire biogeographic appearance of a country, determine the strategic or tactical decisions. Whether the soldier invades a country in order to conquer it and hold it, or he merely overcomes it in battle and passes on through it to invade another country, he will always come into closest contact with the biology of the soil, its vegetation and the animals and men settled in it. He cannot escape them even during the most violent fighting, particularly not if he stages his preparations for battle in such an area or he occupies such an area after a victory. Whether or not the soldier will advance or fight in a "healthy" or a "diseased" area depends on the condition of the soil and its flora and fauna. It is therefore the task of epidemiology as a branch of military medicine to neutralize the noxious influences of the diseased area, or if this cannot be done to reduce them as much as possible. Both have to rely on medical geography and, just as strategic and tactical warfare will overcome and eliminate the obstacle of a mountain or a water course cleverly used by the enemy for defense in the "fighting area", so must epidemiology accomplish the same strategic work in overcoming and eliminating the epidemics existing or insinuating themselves in that area. Just as the soldier during combat often changes a landscape by his intervention, the epidemiologist must sometimes do the same to make the nature of the country his servant in the battle against epidemics. In every case he alters its biogeographic appearance and with that its map. Without a map such extensive accomplishments are impossible.

The principal value of every war map is implied in the fact that it also constitutes a basis for considering the situation. Just as tactical planning for a military operation employs the map of the unknown area for the prognosis of the outcome of the battle using physical geography as well as the proper disposal of men and arms, so must the epidemiologist provide from medical geography and from the information concerning endemics and epidemics on a historical basis the prognosis for fighting the epidemics. Only then can the real epidemiological situation be recognized distinctly.

The decisions in strategic warfare are not infrequently influenced by such an epidemiological map showing the results of medical scientific studies and research work. The publication of the Atlas of Epidemiology is therefore compiled with the intention of contributing to the protection of the German forces from any damage through invisible enemies.

DR. ZEISS,
Colonel,MC,
Consultant Epidemiologist
on the Staff of the Chief
Commanding Officer of the
Medical Service of the Army.

High Command of the Army,
Medical Service of the Army,
Berlin, in the Autumn, 1942.

MEDICAL CARTOGRAPHY AND CONTROL OF EPIDEMICS

Lecture given during the II Conference of the Medical Consultants (Eastern Theater) of the German Armed Forces in Berlin (2 December 1942), before the German Military Medical Society in Berlin (18 February 1943), and before the German Cartographic Society in Berlin (17 March 1943).

Translation prepared by:
U. S.Fleet, U.S. Naval Forces, Germany
Technical Section (Medical)

Any study of medical cartography must be based upon the knowledge and a clear picture of the two elements from which it has arisen, that is medical geography and geographic medicine or, in short, geomedicine. For the development of medical geography which relies upon medical topography, and which can be traced back as far as the times of Hippocrates, numerous most interesting documents of German medical science are available. However, these have not yet been evaluated completely for the practical and theoretical use of modern epidemiology. Valuable material on many regions of Germany is still concealed in them. In cooperation with the geographers, the geologists and the cartographers, epidemiologists will often be surprized how many forgotten or unnoticed sources are to be found. The same applies to the medical geography of all other countries in which material frequently has been found which has been available for decades without having been evaluated, as I just discovered in a certain country where the practical value of the material for the field of epidemiology was not recognized sufficiently. The same may happen in other countries too, as one discovers when investigating foreign sources to complete German research work. This fact applies particularly to the medical topographies which were developed principally in Germany in the course of the 18th century. These have been collected for many years in the Institute of Hygiene of the University of Berlin and detailed studies on them are being prepared. Some of them have already been published. In the "Archiv fuer Bevoelkerungswissenschaft und Bevoelkerungspolitik" Vol. 5, page 175 (1935) I made reference to them as a very important source of information for ethnology, and it was JUSATZ who recently outlined their significance for geographic research in "Petermann's Geographischen Mitteilungen" 1943, page 159. Even though these medical topographies are usually concerned with only one certain town or district, as they were compiled by the local medical officer, sometimes more accurate remarks are found referring to military matters, because mention is made of losses through infectious diseases and other hazards during military action in the respective places and districts regarding the population and troops operating in the area. Later on the former Prussian and Imperial Austrian Ministry

of War recognized the value of the topographic descriptions of the medical experience of garrisons, though these were published only in a limited number and shortly afterwards were abandoned.

Contrary to this the Russian authorities continued the research work which was initiated by the classical medical dissertation of K.E. von BAER about the Estonians (Dorpat 1814), who in his turn followed the German model and created an exemplary work. Thus two collections of medical topographies were published during the seventies of the 19th century which were completed according to the systematic plan usually employing the authorship of disciples of the Military Medical Academy in Petrograd. These collections revealed glimpses of military medicine. Here again, German medical officers serving in the Russian forces during the Crimean War made remarkable observations which could even have been published in our days. I am thinking principally of the old descriptions of the medical, geographic and topographic situation in the Inkerman Valley, and of the most severe type of malaria which was prevalent even at that time. Though in the following years these efforts were not continued, the interest in medical topography remained alive. New impulse was given by the expansion of Russia towards Central Asia, Alaska, and to the Far East before the conflict with Japan. That was especially promoted by World War I, and by the decisive importance of the Caucasus mountains during the war against Turkey. During that time numerous very detailed topographies accompanied by maps were compiled by Russian medical officers. In these we find a most accurate description of the geographic significance of the strategically most important areas of the Caucasus mountains, and with that considerations of the epidemiological importance regarded from the military point of view. According to the sources available to me, the Soviet regime continued those topographies with special consideration of malaria occurring in the Caucasus mountains. In view of the considerable accuracy with which they handled all these military topics one may expect valuable contributions to the medical topography of the Caucasus mountains in general and concerning malaria in these mountains in particular, even if one relies exclusively upon the abstracts made from them. The evaluation of the Russian medical topographies which so far has been made for 120 of them is carried

through in a common investigation by Professor RODENWALDT and several associates.

Turning to medical geography we observe that it consists either of several medical topographies of single places or districts or that it comprises the medico-geographic description of a country as a whole, of continents, or of the whole earth. The topic varies between the description of all endemic or epidemic diseases occurring in the respective territory, and the medico-geographic presentation of a certain disease. Such a medical geography usually is a kind of "instantaneous design of the epidemiological area" of a geographic unit. The single stages of the design are presented in the varying development and very frequently they encompass the adjoining healthy area. In any case borderline areas play their part, as they are recognizable as a barrier against an infectious disease or as a medico-geographic border against the endemic form of a disease, according to whether or not one is confronted with traveling or stationary diseases of parasitic or non-parasitic origin. Particularly during the 19th century we owe a number of results to medico-geographic investigations.

The synoptic evaluations of medical topographies of the 18th and 19th centuries sometimes are voluminous compilations of more or less critically digested material. Within these range the well known German works of FINKE, ISENSEE, FUCHS, HIRSCH, MUEHRY, SCHNURRER and the French authors BORDIER, LAURENT, LOMBARD, POINCARE, the Italian author MUZIO and others.

A review of the cartographic methods according to which the various investigators recorded their results, and endeavored to present them in a lucid geographic form in the synopses on medical geography or infectious diseases - I just mention SCHEUBE, MENSE, KOLLE-WASSERMANN, and many others in foreign countries - reveals very primitive concepts which do not attain the high level of the methods used by the geographers, nor can they be compared with them. The cartographer as well as the epidemiologist has so far overlooked the medico-geographic map and in the course of one century they

made only weak attempts to create a medical cartography; for even LOMBARD's work and his "Pathological Atlas or the Presentation of the Geographical Distribution of the Principal Diseases" is the only heretofore known attempt at an Atlas of Diseases and Epidemics, which after all was a complete failure. Other scientists also tried to attempt various methods of the geographical presentation of diseases on maps, and cartographers such as August PETERMANN and Hermann BERGHAUS contributed more or less successful studies. These noteworthy preliminary studies and attempts were reviewed by JUSATZ in the "Mitteilungen des Reichsamts fuer Landesaufnahmen" 1939.

Therefore until recently we have been confronted with a great variety of medico-topographic and geographic maps among which the topographic presentation sometimes was better than others, as it was restricted to regional maps or very simple drawings, which as in a military sketch showed the actual situation.

A strong impulse was given to medical cartography by the creation of the concept and method of geomedicine. When I first (1931) made this suggestion which was initiated by my extensive expeditions and travels in southeast Russia I postulated entirely new medico-geographic and geomedical maps and Atlases and a special geomedical method.

I postulated the prognosis as one of the principal tasks of geomedicine, which is as dynamic as geopolitics. From this the development of geomedicine was induced under the influence of Karl HAUSHOFER to whom I owe practically the entire concept of an establishment of geomedicine in accordance with his method of geopolitical research. Geomedical research work is based upon two premises:

1. The knowledge of the geographic structure of the territory to be investigated with the geomedical method, that means its borders, its surface structure, its soil and its paleontology, its zones of "particular sensitivity", its general climate as well as its special local climatic conditions, its symbiosis, its civilization, its urban landscapes and many other things.

2. The knowledge of the medical and medico-historical events in the territory to be investigated.

Briefly described, geomedicine is that branch of medical science which is concerned with the investigation of the spatial and chronological relations of the progress of disease in concurrence with the progress of other events. For many years HAUSHOFER and his school of thought have been working on the theoretical and practical aspect of dynamic maps. They have developed special methods of describing geopolitical events and progress which are generally known from the geopolitical literature or at least from the newspapers. However, the German geographers too have recently subjected the dynamic map to critical and systematic discussions. The difficulties of presentation frequently apply by more to the topic than to the method. The two problems, however, cannot be discussed separately and their solution will be all the more difficult because in the dynamic map in geopolitics as well as in medicine the progress in time and space have to be presented in only two dimensions. The difficulties are not present if only attempts to outline the actual distribution of a certain disease throughout a geographical entity are made if this distribution of the disease is a matter of the past or of slow changes. Matters are different as soon as one desires to display the progress of an epidemic on a map. We undertook this with a typical migrating epidemic, cholera, and we described for a period of many years the various appearances of cholera in Germany, Russia, Great Britain, Austro-Hungary. The descriptions of cholera in Poland, Switzerland, Belgium, France and Greece are being prepared. In this we employed a method heretofore unknown in medical cartography and with great success. We used the method of geography and cartography which draws isohemeres, such as isobars, isotypes, isotherms and many others. OLZSCHA, for instance, when studying cholera in Russia called his lines indicating the incidence of the disease <u>isodates</u>, that means he connected all these places in which cholera occurred on the same day and in this way he studied the invasion of cholera in Russia. In one place he marked the invasion as an eruption and he followed the progress of cholera in the country. This method provided entirely

new results and supplied new information on the migration of a bacterial disease which is not spread by wandering rodents as for instance plague and tularemia.

This geomedical method does not mean the final stage of development. The contrary is true, the geomedical method stands at the beginning of its development. It permits a large number of other valuable combinations such as, for instance, including the density of population, the botanic and the zoologic geography of animals transmitting the disease and the areas where they find their food, and in addition it permits considering simultaneously the most important geological condition of the soil upon which the settlement of man and animals always depends.

In addition the method considers the alteration of a landscape by man, which is effected during peace and war, the alteration of a landscape by natural events which through the forceful action of a flood, of a volcanic eruption, of an earthquake changes the appearance of whole areas, or it has to take into account the slow development of changes in the coast line, of swamps, the rise and fall of the subsoil water level be it through man or the persistent influence of nature. The extent to which geomorphological analysis as "diagnosis" and "therapy" is apt to provide clarity and remedy in geomedicine has been repeatedly outlined by RODENWALDT, most recently in his lecture "Geomorphological Analysis as a Means of Epidemic Control", held in the Eastern Theater of Operations (12/2/42). I want to point out that the prognosis is the final objective and the highest point of development of geopolitics and geomedicine.

This may be demonstrated by a significant example. Before the war the investigations of MARTINI revealed in his book "The Route of Epidemics" suggestions concerning the geographic distribution of tularemia which were followed up by JUSATZ. The following results were obtained:

> The principal area of distribution of tularemia in Russia, that means of the rodents transmitting the disease, shows a precipitation of 250 to 500 mm. This appears in the areas of Voronesh, Kaluga, Rostov and Orel. Our prognosis indicated that these

areas would certainly become areas of disease. The expectations were fully confirmed by the occurrence of tularemia during the war years 1941-1943. Even though tularemia did occur in previously healthy areas it did not become lodged there as the biological conditions for the rodents were unsatisfactory. However, if we look at the remaining foci on the map, we recognize that there are areas of Germany which are threatened by tularemia, since all biological conditions are probably fulfilled and even the rodents transmitting the disease are to be found in these districts.

But apart from this valuable preliminary work in the field which transforms geographical topography to medical topography, there is no methodical cartography of epidemics, in short an Atlas of Epidemics.

The gap is to be filled by this Atlas. According to the wishes of the medical officer who defined the task, General (MC) Professor Dr. med. S. HANDLOSER, Chief of the Medical Services of the German Armed Forces, the regions treated in the present war edition of the "Atlas of Epidemiology" shall be restricted to an area comprising continental Europe, the Mediterranean Basin, the Near East, the Transcaspian Region and Eastern Europe as far as the Ural Mountains. The concepts upon which this work is based have been outlined by me in the introduction to the Atlas of Epidemiology to which I here refer.

Thus the medical map becomes a prognostic instrument in the hands of the epidemiologist if he makes use of it with common sense and critical experience. If he disregards this restriction and instead attempts to read things out of the maps which are not there and if he pays no attention to the bacteriological and clinical diagnosis of the epidemics, he is merely a crystal gazer.

It is not permissible to use the geomedical method of the diagnostic and prognostic map exclusively, but it must be employed only in the closest association with all other facts. Every faulty use will yield the

same detrimental results as in geopolitics. The powerful force of the medical map will then turn against those who use it and from a scientific means of research it becomes a poison causing an euphoric attitude whose sequelae may hit the population for which the epidemiologist is responsible, be they soldiers or civilians.

H. ZEISS

(Institute for General and Military Hygiene of the Military Medical Academy and the Hygienic Institute of the University of Berlin).

FOREWORD

to the

TRANSLATION

of the

ATLAS OF EPIDEMIOLOGY.

The age of the airplane, jet-propulsion and the rocket have brought to man's attention more forcibly than ever before, the fact that all men live on one globe. No longer is it acceptable to think of the world as a collection of continents separated from each other by the various seas and oceans. A new galaxy of subjects has developed on this basic concept of one world. It would perhaps be more exact to say that each of the sciences has taken on a "one world" facet that is more or less new to it. Geo-medicine is that new facet on the healing arts. Yet even here, as with a number of other sciences, this is not a new concept in the sense of original discovery, but rather it is new in the sense of general recognition of its importance.

Geo-medicine, or medical geography if you prefer, can safely be described as a field of science that is certain to grow tremendously. Despite the intense interest of a number of pioneers in this field and the fact that the early works are quite old, there is yet so much left undone and untouched that it is almost as though the field was new.

When the German political machine set out on its campaigns of conquest, the opportunity for the realization of a long time ambition of two men was presented. During the First World War two young doctors stationed in the Balkans discussed and talked about one day making an atlas of the world to show the various diseases along with the geographic and climatic factors having an influence on them. The senior of these was Ernst RODENWALDT and the junior was H. ZEISS. At the war's end circumstances and events shaped the course of their individual lives differently and each went his separate way, maintaining contact and never losing the dream, but they were unable to do anything about it directly. The magnitude of the problem and the tremendous research necessary for its completion were tasks they could not undertake as individuals and still make their way in life. With the outbreak of the Second World War these two were again brought in contact, this time the senior being Zeiss and the junior Rodenwaldt. In an atmosphere of expansive schemes of all sorts it was not too difficult for the idea of the atlas to be put convincingly before the high command. In due time orders were given and it became one of the major tasks of the epidemiologists of the German Armed Forces. It was only by mobilizing the resources of the wartime expanded economy of the nation and the availability of whatever manpower was needed that it could be undertaken with reasonable certainty of carrying it through. As armies advanced field representatives were able to enter areas previously somewhat inaccessible in some cases and, in the course of reestablishing some sort of public health control to obtain valuable information from local sources. It was in this manner that much of the information concerning southeast Russia was obtained. Some of their findings may be read in the translations of the Reports of

the Conferences of the Medical Consultants to the Medical Services of the German Armed Forces, another translation project of the Naval Technical Unit, Europe (Medical Section).

Another group of researchers were combing the available literature for reports concerning areas which were more accessible. The project was a matter of considerable pride to the high level medical command. And it was so very justifiably. The compilation of the Seuchen Atlas was a monumental task. Although undertaken in war-time, and presumably advanced to the military as a strategic necessity, this atlas will find its uses and its place in peacetime just as widely appreciated.

The Medical Section of the Naval Technical Unit, Europe, recognizing the value of this work as a scientific undertaking, spurred on efforts to locate copies of the Atlas and when they were available began the chore of its translation. Other projects of higher priority made progress slow at first but during the course of 1948 it became the project of highest priority and its completion is in sight. The major portion of this work has been translated in Germany by a German group. The preliminary translations were then sent to the United States for editing. They were then returned to Germany for further inquiry and editing before they were prepared in their present mimeographed form. Although cooperation has been of the highest order this wide separation has made impossible much of the close collaboration that is so important to this kind of work. Professor Rodenwaldt, although not a member of the translating group, has been available in Heidelberg for consultation on the points of obvious uncertainty. He has given his assistance in a generous and kindly way.

Although primarily an undertaking of the Medical Corps of the U. S. Navy the possibility of carrying this work through to completion has been very materially aided by the cooperation and sympathetic encouragement of Major General A. E. NOYES, Theater Chief Surgeon of the European Command, U. S. Army. Always ready with his personal assistance and the resources and personnel of his organization has been Lt. Col. Carl J. LIND, (MC.) U. S. Army, Commanding Officer of the Fourth Medical Laboratory. At a time when the project was at a critical state he gave inestimable help in housing and logistic support for the personnel of the translators organization. That the translation is completed at all is an example of the finest kind of cooperation between the medical corps of the Army and the Navy. Acknowledgement must be extended to those more distant from the immediate scene who gave unfailingly their personal approval and support for the continuance of the translation work of the section. Outstanding among these were Rear Admiral

C. A. SWANSON, Surgeon General of the Navy and Captain A. R. BEHNKE Research Executive of the Naval Medical Research Institute.

HARRY J. ALVIS,
Commander, Medical Corps,
U. S. Navy.

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TO THE

ATLAS OF EPIDEMIOLOGY

Translation prepared by:
U.S. Fleet, U. S. Naval Forces, Germany,
Technical Section (Medical).

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Section VIII

North and West Africa

* * *

OBJECTIVES AND METHODS OF MEDICAL CARTOGRAPHY.

Translation prepared by:
U. S. Fleet, U. S. Naval Forces, Germany,
Technical Section (Medical).

I.

Medical Cartography as an applied medical and geographical science is considerably older than is generally known. Even Max ECKERT made a mistake when he wrote in the 2nd volume of his "Kartenwissenschaft" (Cartographic Science) published in 1925: "Two decades more and medical geography will be a century old. It was in 1853 that Caspar Friedrich FUCHS wrote the first "Medizinische Geographie" (Medical Geography) and in 1856 it was Ad. MUEHRY who wrote "Die geographischen Verhaeltnisse der Krankheiten" (Geographical distribution of diseases). The maps illustrating this distribution are referred to as "disease maps" or "nosological maps".

In reality, however, the first German text book was written, as I could prove, 60 years before, in 1792, by Leonhard Ludwig FINKE, though it must be granted that it did not include medical maps. A map illustrating the geographical distribution of diseases was submitted as early as in 1827 to an assembly of natural scientists and medical doctors by Friedrich SCHNURRER. The decisive impetus for the edition of disease maps according to my investigations came in the beginning of the past century from a medical event of world historical importance, namely the first appearance in Europe of Asiatic Cholera (1830). In connection with this event a great number of maps were published illustrating the spread of Cholera from India to Europe and its incidence in the different European countries.

The presentation of the methods used at that time to fight epidemics, that is by the establishment of sanitary cordons may also count among the early rudiments of medical cartography.
The most impressive example is a map of the year of 1831 representing the unfettered spread of cholera into the provinces of Eastern Prussia in spite of the five different cordons which are also shown on this map. The Preussische Staatsbibliothek treasures several hand-colored maps of the years 1739, 1750 and 1770 representing the pestilence cordons at the Eastern borders of Prussia and the Southern borders of the Reich which may be considered as early precursors of this type of medical maps. Thus it may be said that medical cartography even in its early beginnings served important practical purposes besides purely scientific research.

II.

Since these early attempts it is the main objective of medical cartography to show the geographic distribution of diseases and epi-

demics in the different countries and continents, so as to give in the final result a survey of their distribution on the globe. These attempts to give a geographic display of medical phenomena by means of a plani-globular projection and to divide the earth into different zones with typical diseases, which were probably first carried through by BERGHAUS in his "Physikalischer Atlas" published in 1848 and recently by PETERMANN in 1921 (Geographische Mitteilungen, Map 4 to 7) and by M. SORRE in his book: "Les fondements biologiques de la Géographie humaine" (1943) require, however, an exact inventory of all incidences of diseases and epidemics on the globe. Similar to the objective of geography to give a true display of the dimensional aspect of the earth (SORRE), medical geography and cartography in the above definition will be an equally important science along with morphology and climatology.

If considering a map as a source of information on the one hand, and as a means of description on the other hand, the medico-geographical maps which have been published so far must be placed under the first category and they constitute valuable sources for further research work. They are medico-historical evidence of former medical conditions.

H. ZEISS attributes to the maps representing the spread of cholera in the beginning of the last century the status of documents.

The task of medical cartography is, however, by no means confined to a cartographic synopsis of all diseases and epidemics on the globe. It might be of great value in tending to clarify the question whether the differentiated incidence of diseases and epidemics has a correlation with the particular character of the landscape and other geographic conditions. It is incumbent to the field of geomedical research work, the necessity of which has been first emphasized by HEINZ ZEISS in 1931, to give an exhaustive answer to this question.

August PETERMANN in the introduction of the text part of his "Cholera Map of the British Isles" of the year 1848 appreciates this second task of medical cartography as well as the outstanding importance of the map for that part of medical research dealing with the causes of diseases with the following words: "The present work, that is the edition of cholera maps, is intended to supply an insight into the areas of distribution of this devastating disease and to discover the local conditions which are susceptible to influence its progression and severity. The geographic representation is particularly valuable for this purpose and cannot be dispensed with. The representation of figures and symbols - no matter how diligently these may be tabulated - will not fix in the mind the relative importance, the

space relation and the distances. Only the geographical map can help to acquire correct impressions of relative size and importance in connection with the existence and development of all kinds of medical phenomena.

If the task of medical cartography has been confined up to now to providing a geographic synopsis of all diseases and epidemics in the service of medical geography, to allow for comparisons of the different diseases in various spaces of the globe and to trace common factors as to the form of progression, this task will have to be extended in the sense of ZEISS in that the map will in the hands of the geo-medical scientists become a scientific means in the research of the causes of diseases and epidemics.

In analyzing the activities of medical geography, emphasis is not only placed upon the relation of medical and geographical factors, special attention is devoted to the possibility of establishing, on account of the knowledge so acquired, a prognosis with regard to the behavior and progression of a specific disease in a given geographical space. The disease maps thus serve the causes of socialized medicine and hygiene. A mere tabulation of diseases as was practiced up to now could not possibly cope with these prospects. Geomedical maps must indicate the possible trends of the development of a specific disease or epidemic in the different areas of the world. A new task has thus been given to geo-medicine which is comparable to the studies of maps for the exploration of space as brought forward by Walter GEISLER in his report to the Deutsche Kartographische Gesellschaft on 29 March 1941.

To apply the cartographical methods as a means of research in the geo-medical field it will be necessary to classify the statistical material according to geographical points of view on the basis of a physical map. Similar conditions prevail in the exploration of space. Diseases and epidemics do not respect political or administrative boundaries, their incidence and spread is ruled by the law of nature substantiated by geographical conditions. Only by entering every case of a disease or fatality relevant to geo-medical studies as well as all the factors that may favor that type of disease, such as the fauna and flora into a physical map, will it be possible to arrive at a general appreciation of the spread of diseases and epidemics in correlation with geographical conditions. A survey on the medical maps which are now available will give the best idea as to the possibilities of which medical cartography disposes for the solution of this problem.

III.

As set forth in the history of medico-geographical maps which I have outlined in the "Mitteilungen des Reichsamtes fuer Landesaufnahme" (Bulletin of Reich Surveys and Maps) 1939, Part I, there is a long standing desire of all who are interested in medical science for cartographic material to impart a better presentation of the subject matter. Simple black and white maps without an underlying topographical color scheme did not receive much favor because they were not very legible. This type of map is merely a descriptive survey of the recorded diseases. The entering of simple symbols for the different diseases and fatalities into black and white maps is hardly more than a makeshift solution at the expense of legibility and as Max ECKERT put it, these maps are not half as legible as they would be if a color scheme had been used.

In such cases where we have to deal with a presentation by means of circles, sectors and columns illustrating the recorded diseases and fatalities, as is for instance the case in the regular report on diphtheria and scarlet fever in the "Reichsgesundheitsblatt" (Bulletin of the National Office for Public Health) and which means "replacing the sequence of a statistic by the parallelism of a map" (W. GEISLER) one should not speak of maps. Siegfried KOLLER calls that type of representation "Geo-statistical Charts". These presentations, as is the case with all cartograms, are a result of the desire to present the dry figures of statistics in a more communicative and impressive form.

The medical maps properly speaking may be divided according to the method into the following categories:

1. Locator Maps,
2. Distribution Maps,
3. Progression Maps.

1. Locater Maps: All types of cartographical records of a sporadic or accumulated incidence of certain diseases or fatalities - possibly including an indication of the number of cases expressed by size or color of the legend - are referred to as locator or position maps. These maps reveal in the most simple manner the local incidence as well as the distribution over a certain area but they do not furnish any clue as to the boundaries of the respective disease area and do not allow for any prognosis whatsoever because they only reflect the investigated conditions in that particular area. The best example of a locator map is the presentation of C. SCHLIEPER of the "Ankylostomiasis

in Italy 1882 to 1932" (Map VII/7a). By using different colors and symbols it is perfectly possible to present several related or opposed diseases with sufficient accuracy on one and the same map. (See: "Paratyphus C in the Mediterranean Basin" by H. HABS, Map I/7).

Locator maps furnish the elements for any research work in the biologic-ecologic field. With regard to medical cartography these maps indicate the places where certain diseases or causative agents of diseases have been discovered and they are very suitable for the presentation of diseases or epidemics with a rather rare occurrence, such as leprosy in Europe. The incidence at certain epochs can be marked by slight variations of the legends or by different colors if the same symbols are to be used. The following examples are mentioned in this connection: "Leprosy in Sicily 1867 - 1924" by H. J. JUSATZ (Map VII/6a) and "Leprosy in the settlements at the mouth of the Volga River" by Th. BERSIN and H.J. JUSATZ (Map IV/6a).

The relation of insects and other arthropods to disease is also preferably presented on locator maps which suit the purpose better than the formerly used distribution maps (See BERGHAUS "Physical Atlas"). Locator maps have actually been used for the distribution of anopheles, aedes aegypti, and ticks (see Maps II/3, III/2, VII/7 and VII/8). The different types of insects can be indicated by specific symbols or signs in different colors which are marked at the place where they are found. For the sake of a more accurate indication the respective localities are marked by numbers and the respective names are given on the margin of the map. The use of several legends next to each other did not turn out satisfactory in distribution maps for insects as was seen in a presentation of that kind of the different types of anopheles in the Near East (map II/2).

2. Distribution Maps cannot be prepared exclusively by the absolute method, as is the case with locator maps, but it is advantageous to use the relative method at the same time. In this relative method, the number of cases is brought in relation to the number of inhabitants, for certain lines of research also on the density of the population and only in very exceptional cases to the size of the area. The distribution maps of either method constitute an inventory for one or several diseases in a given geographical space. They thus represent medical maps with a statistical feature which reflect the disease or health condition at a definite time, one might call them "snapshots of a definite disease condition" (ZEISS). In some instances they present the predisposition for diseases or epidemics in a certain geographical space, in other words, the medical phenomena are brought into relation to the geographical factors such as they

appear in the map. This type of geo-medical map reflects the development of a disease or epidemic in the geographical space by a systematic evaluation of detailed observation which allows for a determination of the general trend. These maps have a dynamic feature and enable us to establish certain prognostic conclusions.

<u>2a. Medico-geographic distribution maps:</u> The first type of distribution maps may be successfully used if General-Survey Maps of a large area or continent are required with a scale of 1:15 millions or less. For large areas or continents it will answer the purpose if the respective diseases or epidemics are entered by large open colored hatching. It will be possible to enter different diseases or epidemics by using different types of hatching or cross hatching as is demonstrated in Map II/7 and VII/7 on the incidence of schistosoma haematobium, schistosoma japonicum and hookworms. It must, however, be avoided to enter too much into one map. Even the best cartographic presentation will become illegible by accumulating too many colors and different types of legends. In these cases it will become necessary to list the diseases in special cartograms and to provide the reference by printing small numbers at the respective places of the map. It is a general rule in medical cartography to adopt the same size relation for all indications entered into the same map. Older maps often present the disadvantage of using dots for one disease - dots are used in modern maps to indicate localities only - and shades or hatchings for other diseases, whereas a third disease finally is simply marked by colored contour lines, thus mixing up the methods which are now reserved to indicate the distribution or to mark geographical areas respectively.

The intensity of the infection may be simultaneously indicated in a rough approximation in the distribution maps as is shown in map IV/6 "Leprosy in South East Russia" by H. J. JUSATZ and endemic areas by cross hatching (see Plague Centers of 1st and 2nd degree in Europe etc. by H. J. JUSATZ, Map I/1).

The simple method of presenting the distribution of diseases allows at the same time to mark sporadic occurrences of the disease in addition to the hatched areas by encircling the names of the localities (see map VII/5) and to stress those areas where the disease is particularly frequent (see "Amebic Dysentery in the Near East" by G. PIEKARSKI, map II/4). In any case, the meaning of the respective signs must be explained in a legend.

These general distribution maps have only little value for the more frequent, so called ubiquitous, diseases which occur more generally, at least in certain climatic zones, such as tuberculosis, typhoid fever, syphilis, pox, malaria, and rheumatism. Nor are they suitable for presentations on a larger scale than 1:5 millions. In that case, the agglomeration areas must be made apparent and simple hatching of different width does not prove satisfactory. Only one, perhaps two diseases may be presented in one map. The colored impressions must either be made by hatches of different size, in some instances to the density of a screen or colored shade,as was done in the presentation of the distribution of trachoma in the Mediterranean basin (map VII/12 by W. ROHRSCHNEIDER) and in Spain (map VII/12a by H.J.JUSATZ) or still better by the use of a gliding color scheme which may include two different colors in order to obtain a maximum of contrast (Occurrence of Malaria in Spain and Portugal by E. MARTINI and H.J. JUSATZ VII/2 and in Italy VII/3). These maps present a maximum of legibility as regards the intensity and distribution with which a disease or epidemic has invaded the different areas (malaria, cholera or influenza) or as to the repeated occurrence of typhoid fever and trachoma. The color scheme must be chosen so as to ensure that the underlying physical map will not become illegible.

Distribution maps of this category should as a rule be made according to the relative method and the frequency of the disease will be related to the number of the indigenous population. Thinly or non-populated areas must be left out in the color impression (see Poliomyelitis in the Space of the Baltic Sea by G. FINGER, map V/1). The layout of all maps shoule be such that they can always be used as a source for the numerical statistics which were used for their production.

In case that the distribution of a disease during a certain period of time is to be represented one may also have recourse to the dot method which was introduced by N. KREBS (1921) in surveys on the density of the population but which had been used before in the year 1848 by August PETERMANN for the above mentioned plague map (see PETERMANN's Geographische Mitteilungen - Geographical Magazine - 1940, Table 23). In spite of the perfect presentation of these maps from a cartographic point of view, they are of little appeal with respect to their legibility as has been pointed out by W. BEHRMANN in the Jahrbuch der Kartographie - Year Book of Cartography - 1941.

2b. Geomedical distribution maps: The second objective of medical cartography, namely the presentation of the distribution of diseases

and epidemics in their correlation to the local conditions of the landscape, the soil and the climate, in short the establishment of geomedical maps as a tool for research concerning the causes of diseases, makes it unavoidable to turn away from the statistical rigidity of the map presentation which W. GEISLER has already proposed with respect to the planning maps of the space explorers and to favor a more versatile fixation according to the natural factors such as flora and fauna. The topic of each medical map reads as follows: The behavior of a disease in the landscape and its relation to the peculiar factors of this landscape, the development, relation to the structure of the population, the natural extinction of this disease or elimination as a result of control measures.

Geomedical research in its present state confirms that the spread of epidemics is dependent on topographic conditions and certain geomedical barriers which cannot yet be accounted for, rather than on administrative boundaries. It may, therefore be said that medical maps are only suitable for geomedical research if the result of the investigations obtained community by community is entered into such a type of map which set forth all topographic details of the landscape as well as the conditions of the soil. In this case a collection of these maps will permit certain conclusions with regard to the correlation and coincidence of certain topographic conditions with specific epidemics and diseases. If such a coincidence can be observed over an extended period of time in certain areas, the local or endemic character of that particular disease or epidemic will become obvious and conclusions as to the conditions favoring this state will be possible. Very illustrative examples in this respect are the very careful Swiss investigations in some villages of the cantons of Zurich and Aargau with regard to the incidence of goiter, the investigations of STICKER with regard to plague and some geomedical records on malaria. The "constancy of local intensity" (Th. DIETERLE and J. EUGSTER) which has been ascertained in the Swiss investigations with the regularity of a natural law, even though important movement of the population was involved almost creates an urge for the compilation of geomedical maps, the more so, since analogous observations were made in Sweden, where the villages with the highest goiter rate are preferably located in the neighborhood of meandering rivers or dense forests. In the endemic areas there are islands which are absolutely free from goiter, such as the villages of the Boezberg which appear "as being stamped out of the landscape" (ZEISS). For this type of investigation it will be necessary to use plane table sheets or community maps in which the invaded houses will be marked. A confrontation of the maps thus established over a period of 20 years reveals quite obviously the pronounced local character of goiter.

One might say that the disease nidifies in the landscape and it

is up to the cartographic presentation of this type of disease to trace the geographic factors which to a certain extent determine the spread of the disease. This may practically be done by a presentation of ecologic factors, such as the occurrence of a certain type of animals which constitute a reservoir for viruses (rodents, ticks, etc.) or of disease transmitting insects (anopheles, aedes aegypti) or zones of vegetation, formation of soil, climates, etc. (see maps of the distribution of citellus and plague in the region of the lower Volga IV/1a). Geomedical maps so compiled allow for a prognosis as to the probable trend of spreading of the epidemics as I have first demonstrated for the distribution of tularemia, a pestilence-like disease of rodents and men in the maps published in PETERMANN's Geographische Mitteilungen 1940, maps 24/25 in which are presented along with the actually invaded areas, the most imminently endangered areas of dry climate in Central Europe.

Geomedical research work with the object of presenting the correlation of topographic and medical factors, must under all conditions be based on good physical maps! Medical cartography, as a result of the development of this new field of research, finds itself confronted with a host of new tasks, the solution of which is by no means simple and depends upon a close cooperation between medical experts and cartographers. Geomedical maps require that the physical maps be provided with an additional color scheme to represent the different vegetations, soil formations or climatic conditions which is usually achieved by shades of color. In the choice of colors it must be borne in mind on the one hand, that the colors used for the medical information do not combine with the underlying colors of the physical map to form new colors and on the other hand, the distribution area of the specific diseases must stand out clearly against the zones with indifferent or even antagonistic geographic factors. Maps of this particular kind do not yet come under the scope of this atlas. In the particular case of the Mediterranean fever the distribution area is identical with the area of the typical etesian climate which on the other hand corresponds with the distribution of the goat as the main mild yielding domestic animal and this correlation is so obvious that the distribution map of Mediterranean fever by H. HABS (map VII/1) may be considered as a good example of a geomedical map.

The distribution maps present, furthermore, the problem of delimitation. As a matter of fact the maps which are based on statistical data will have the boundaries of the represented distribution correspond with the administrative boundaries. This will, however, only in very exceptional cases reflect the real conditions, particularly so

if considerable differences exist in the medical supervision and methods of socialized medicine and control of epidemics between the adjacent territories. In reality, the administrative boundaries are no natural barriers for diseases and epidemics. The areas, however, where organized control measures are employed and promoted by the respective authorities do, to some extent, present a coherent complex and may be used as a basis in this type of maps as has been attempted for instance in the map by E. MARTINI (map II/2a) on the "Incidence of Malaria in Turkey". In some instances a map representing the net of medical outposts and stations may impart an idea of the frequency of the respective epidemic as is the case in the maps on Malaria (II/2a), Plague (IV/1a), Leprosy (VII/6) and Trachoma (VII/12a.)

3. Progression Maps. In contrast to the so-called nidifying epidemics which are localized, the cartographic presentation of the important wandering epidemics is still presenting difficulties which have not been overcome so far. The problem of the presentation of the chronologic sequence of diseases in the same space has not yet been solved in a satisfactory manner if abstraction is made of the attempt of KOLLER to indicate an increase or decrease in the number of disease cases by the position of the hatching. Dynamic maps on the progression of influenza, hoof and mouth disease, the communicable infantile paralysis etc. The epidemiologic conceptions of intensity and extent no longer cover the complexity of the phenomena. It is not only of interest that more or fewer people are involved but the geographic density of the cases is also of importance. The tendency of the epidemic to expand as seen from a geographic angle may be great or the epidemic may tend to localize at certain areas. It will, therefore, be necessary to include in a map the factors of congressity and egressity (G. FINGER) which terms define the stagnation of the epidemic at one or several centers of different extent. The tendency to expand of an epidemic is described in a very elucidative manner as the "aggressive" course of the epidemic. The concentration, that is the converging tendency of the epidemic to encroach at certain areas is called the "congressive" course of the epidemic. An analogy may thus be established between extent and intensity on the one hand and "egression" and "congresstion" on the other hand in the definition of an epidemic as viewed from a geomedical aspect (FINGER).

If the behavior of an epidemic is observed for several years in a certain area, as has been done by FINGER for communicable poliomyelitis in Wurttemberg during the years 1937/42 (see map VI/2) and if the cases are entered into the map by using dots of different colors for each year, this map will allow for comparisons and conclusions. It can

be observed for instance that a striking accumulation of polio cases was taking place in well defined areas in 1938, such as the valleys of the Neckar, Rems and Fils (black dots), whereas in 1939 there was no congression whatsoever (blue dots) when the disease was spread all over the country in the broadest egression without any recognizable centers. In 1942 the epidemic showed again a similar congression as in 1938 in the same valley areas (red dots).

The maps of cholera in Russia by R. OLZSCHA may be considered as the first successful attempt to represent the dynamics of the course of an epidemic in a geographic space by means of a map. These maps indicate the begin of the epidemic and the points at which the epidemic began at the same time are joined by lines as was suggested by ZEISS (Isodates). The progression of the epidemic is thereby impressively illustrated (see PETERMANN's Geogr. Mitteilungen 1942, tables 34 and 35). The maps reveal that these isodates which connect areas where the epidemic occurred at approximately the same time never have the tendency to intersect as would be the case if the disease would not depend on a certain law and if there would be no correlation between the different cases.

It is the objective of geomedical research to go into this matter and to establish the laws by which the spread of epidemics of the past and of present days is governed and to give prognoses as to the presumable progression of the epidemics. Geomedicine is only in the first stage of its possibility in this connection. In the further course of research it might be discovered that the epidemics follow certain passages as is the case with the weather and meteorologic conditions. The fact that the major epidemics moved in the same direction seems to enhance this idea. With this idea in mind GERLAND writes in the description of his disease maps in the third edition of the Physical Atlas of BERGHAUS: "The diseases are generally spreading in an east-west direction opposite to the earth rotation and there is often a correlation between the direction of the spreading and the prevalent winds".

The creation of maps of the health condition of geographic areas also belongs within the scope of medical cartography. The production of these maps is however opposed by numerous technical difficulties of presentation and method, so that no remarkable health maps are so far available. It will be a prerequisite in this respect to determine the general principles which will have to be adopted in the appreciation of the health conditions in the respective areas. PITTALUGA has suggested resorting the inscription of lines defining the areas of similar or comparative hygienic conditions or possibilities of development (Isohygienic-lines).

IV.

No general scheme for the choice of the method of presentation can be developed with regard to medical maps. The essence of the statement made by GEISLER for the planning maps with that the subject is decisive with respect to the method holds true for medical maps too. It may even be said that the material to be worked up is still more decisive in regard to the method to be used in medical maps. If for instance the distribution of a rather rare disease is to be represented (such as ankylostomiasis, meningitis, poliomyelitis) on the basis of a statistic of the annual cases, it will be the method of choice to enter the single cases by the absolute method, that is by marking them by dots of different size and color. If a map is, however, to be based on the statistical material of certain administrative districts or areas, one will as a rule resort to the relative method - relation of the number of cases to the number of the population or number of the sueceptible members of the population (age groups) - and the presentation will be made by hatching of districts.

Special attention must be devoted to the choice of sources in case of diseases which need not be reported or in countries were no well organized health service is functioning. We are here confronted with the same problems which geography had to face in the times of August PETERMANN who attempted to reduce the white areas in the maps of Asia and Africa. Geomedicine must resort to all possible sources of information such as reports of explorers and medical experts, publications of all kinds, letters of surgeons abroad etc. with the view of securing a conclusive presentation of the distribution of diseases.

It may be expected that the cartographic presentation of diseases and epidemics will be used in the future as a means of epidemiologic prognosis and research prognosis and research of the primary causes of the respective diseases. The importance of geomedicine in the future may be outlined by the statement of A. SUPAN : "The cartographic method is the vital nerve of geomedical research". Their development and furtherance is trustfully laid into the hands of the medical doctors and cartographers who in close cooperation will serve the common cause.

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PLAGUE FOCI OF 1st AND 2nd ORDER IN EUROPE, NEAR EAST, AND NORTH AFRICA.

1921 - 1941.

Translation prepared by:
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All medico-geographic studies of plague must be based upon STICKER's classification of the foci of plague into persistent foci with plague nests and endemic plague foci of the 2nd and 3rd order. Persistent plague foci were according to STICKER the areas of retreat of the shy rodents which in consequence of their living together in great numbers in inaccessible alpine plateaus or uncivilized steppe areas constitute obliging hosts and carriers and prevent the plague bacteria from dying out.

From these century-old plague foci the epidemic blazes up at indefinable intervals and affects rodents as well as humans in the neighboring areas from where plague is spread along the trade routes all over the world by the rats living in the ports and ships. The threat to Europe and the adjacent countries is revealed best by a map of the presently known plague foci on the borderline of Europe, in Near East, and in North Africa.

Beside the Central Asiatic focus which is disregarded here, the presently most active of STICKER's old plague foci is the African endemic in Uganda on the northwest bank of Lake Victoria. From here plague was distributed heretofore to Kenya, to the north of Tanganjica, and across Lake Albert to the Congo State. From Uganda as many as 6000 cases of plague per year were reported to the League of Nations. According to STICKER plague had invaded Egypt from this source.

STICKER mentions the Asir Highlands as the second persistent focus, while the third was in the high mountains around Mt. Ararat. Even though no definite data were obtained in recent years of greater outbreaks of plague from both these sources, a number of smaller incidents of plague in the vicinity of the above mentioned foci indicate that they are not yet extinct. There is no doubt that even for the time being they are still of importance for the distribution of the plague in the Near East, e.g. for the development of the 2nd order plague focus in the Iraq.

A great importance for the endangerment of the European continent by the contamination of the indigenous rodents with plague microbes must now be attached to STICKER's fifth persistent plague focus which is located in the Kirghiz Steppe between Ural and Volga, and which will be dealt with in a special map.

The sources of the 2nd order in West and North Africa range within the plague foci next to Europe which were not known to STICKER and which have developed during the recent decades: These are Dakar and the North African coastline area from Morocco to

Tunisia.

Though contrary to the plague incidence in southeast Russia, in Egypt, and in Iraq, the number of cases reported here is still within moderate limits, their regional and temporal distribution since about 1920 until the recent times demonstrates that the rodents living on the desert border area already seem to be carriers of the plague microbe.

Extensive research work is still necessary to recognize the full extent of this source of danger so close to Europe, and to build up the most adequate control organization.

Only for Tunisia did investigations of the incidence of plague with rats reveal that the plague epizootic heretofore was restricted to the rats living in towns and had not spread to the desert rats, The murine plague was observed in Tunisia in the following distribution (1937): Epimys decumanus 66 %, epimys rattus and micromys gentilis 12 % each, the rest epimys alexandrinus and micromys azoricus. In Sousse, Sfax, near Kairouan, and in some other places of the coastline area isolated cases of plague were observed.

In August 1940 some cases of plague, and plague infested rats were observed anew in Algiers. Here, too, the epidemic seems to be present persistently, even though it was unnoticed for decades, and except for a small epidemic in Conde-Smendou, only a few isolated cases were observed in Algiers, Oran, Philippeville, and Tangier (see table) in 1931.

In the environment of Tripoli from 1930 to 1934 some cases of plague were observed in several places (Ajilat Oasis, Gheran near Zanzur, among the Manisir tribe, in Kebasc, among the Guarat tribe, in Tarbouna, and in Hiscaria).

Morocco displays about the same conditions as the North African Mediterranean coast. After some smaller local epidemics 1920/21 and 1929/30 had occurred in the French Protectorate, isolated cases have occurred nearly every year without the epidemic attaining a larger extent. The last epidemics occurred in 1929 in the valley of Sous in southern Morocco, 80 kms. south of Agadir, and in Settat (1929/30), 65 kms. south of Casablanca, and in addition in Doukkala (1932/33). During the winter of 1940/41 there was a new outbreak of plague in Morocco with 237 cases. This wave of disease continued into the first half of 1942 with 351 cases.

Similar attacks of plague also occurred in Lagos and Nigeria. According to the official reports the climax of the plague curves was attained in the year 1926 with 1300 cases. After 1931 the plague at first seemed to have disappeared from Nigeria. In 1938, however, 26 new cases of plague were officially reported.

Contrary to these Dakar and its hinterland, Senegal, constitute a new and considerable plague focus of the 2nd order. This town suffered a plague epidemic in 1914 with 2000 cases and 1919 a second outbreak with 4300 cases reported. Since this time continuously larger or smaller outbreaks of plague occurred in that district of Dakar where the indigenous population was housed, and in the environments of Dakar, particularly in Thies 65 kms. east of Dakar), Tivaoune, Rufisque, Baol, and Louga. Though the number of diseases has decreased continuously during the past years one must count on a renewed flare-up of this focus at any time.

Table 1.

Occurrence of Plague 1921-1940 according to the Reports of the International Health Organization and the League of Nations compiled by H. J. JUSATZ.

Year	East - Africa			West-Africa		North-Africa					Near East	Europe, Southeast Russia, Ural, Volga, Don.
	Uganda	Kenia	Belg. Congo	Lagos Nigeria	Dakar-Senegal	Morocco	Algiers	Tunis	Tripoli	Egypt		
1921	5871	./.		∅	1799	./.	195	234		356	137	646
1922	1362	./.		∅	1343	34	19	8		487	685	160
1923	938	1090		5	1678	134	6	31		1519	787	489
1924	887	477		414	1834	53	7	11		373	523	144
1925	947	1096		671	408	∅	4	6		138	19	257
1926	1884	530		1330	942	∅	56	424		154	437	179
1927	2171	327		397	2748	∅	19	249		78	18	118
1928	1379	580		530	2035	∅	11	11		496	68	90
1929	5816	766		185	2921	283	4	171		178	135	81
1930	2546	959		64	2227	356	46	123	4	311	134	13
1931	2378	604		5	1017	41	85	117	∅	573	132	6
1932	1945	281		∅	279	16	∅	∅	∅	134	24	./.
1933	858	163		∅	135	87	∅	∅	18	78	28	./.
1934	495	62	14	∅	1100	∅	∅	∅	12	114	10	./.
1935	1083	107	15	∅	418	41	4	18		39	12	./.
1936	962	202	./.	./.	85	./.	8	7		77	1	./.
1937	493	145	6	./.	16	./.	2	3		72	./.	./.
1938	370	26	31	26	1	./.	∅	6		10	./.	./.
1939	312	4	80	./.	./.	./.	1	1		100	./.	./.
1940	./.	6	./.	./.	31	237	6	2		114	./.	./.

Legend: ./. - no data available; ∅ - no case of disease;
empty column - no report.

H. J. JUSATZ.

I/2

EPIDEMICS OF TULAREMIA IN EUROPE, WESTERN ASIA, AND NORTH AFRICA

1921 - 1941

Translation prepared by:
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Since the first few serodiagnostically certain cases of tularemia in man in Russia were recognized in 1926, this epidemic, new for Europe, which infects rodents and man, has migrated through vast regions toward North, Central, and South East Europe and has settled there. The causes and ways of this westward movement are still unknown, but it must be expected that this epidemic will spread further and finds a new constant home among the man-avoiding rodents of the steppe-like regions of Europe, from where it occasionally may pass over to the inhabitants of the country in individual cases or in small local outbreaks. The dependence of the vectors on the bioclimatic conditions, however, - most favorable conditions: slight rainfall and steppe-like vegetation - will keep some regions such as the coastal districts of Western Europe with rich rainfall free from tularemia infections. Also Italy (contrary to a former erroneous report from Rovigo) has always remained free from tularemia so far. As far as Greater Germany is concerned, after the great epidemic of 1936/37 some individual cases have been observed even outside the proper epidemic region (Moravian basin), such as south of the Danube in Schwechat near Vienna, in Graz, and in Burgenland. The most western occurrence of tularemia so far was observed in 1939, when a field hare in the hunting are of the district Neumarkt (upper Palatinate) was proven to be infected with tularemia. The table shows the extent of distribution and the various species of the vectors of tularemia bacteria.

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Table.

Nr.	Year	Region	Number of cases	Species of rodents and vector
		I. Eastern Europe		
		1. River basin of the Volga.		
1*	1877	Astrachan and surroundings	unknown	unknown
2	1926	Volga-delta south west of Astrachan (B.,M.,T.,) up to the Caspian Sea	200	water rats
3*	1927	Governmental District Rjasan	unknown	" "
4	1928	" " " : 12 villages in the district Spask		
5	1928	Governmental District Rjasan: 15 villages in the district Kosimow	Total 800 (200)	water rats
6	1928	Governmental District Rjasan: 310 cases in the district Elatma on the Oka		
7	1928	Governmental District Wladimir: district Melenkoff		
8	1938	Region of Orel, river basin of the Oka, sometimes whole villages infected. Recurrence in spring and fall 1939 and 1940/41	5000	field mice
		2. River basin of the Ural.		
9	1928	Governmental District Orenburg 8 villages on the shores of the Ural river	103	water rats
		3. River basin of the Ob.		
10*	1921	Boltscharovo and adjacent villages on the Ob near the mouth of the Irtysh (Governmental District Uralsk)	1/4-1/3 of the population water rat hunters	water rats
11*	1926	South of Tobolsk		
12	1927	Mirinowo on the Irtysh (district Tobalsk)	75	water rats
13	1928	Samarovsk on the Ob (" ")	22	
14	1928	Jarowoskie-Jurty near Jalutorovsk on the Isset (tributary of the Tobol) (district Tuemansch)	22	water rats
15	1928	Bolscharow on the Konda (tributary of the Irtysh)	12	
16	1928	Kushevatt near Obdorsk on the Ob (district Tobolsk)	27	water rats
17	1928	Muji near Obdorsk on the Ob (district Tobolsk)	75	water rats
18	1930	Kainsk (near Omsk) in the district Barabinsk (West Sibiria)	87	vectors: flies, gnats, ticks
19	1930	Kurgan on the Tobol (Irtysh-Ob)	40	rabbits (hares)
20	1931	Kurgan on the Tobol	54	rabbits (hares)
21	1925	Town in West Sibiria on the river S.	43	water rats (stream water)
		4. River basin of the Dnepr.		
22	1941	Bobruisk, river basin of the Berezina	unknown	field mice
23	1941	Gomel, river basin of the Sozh		
24	1941	Kursk (river basin of the Desna)		
25	1941	Sumy (river basin of the Psel)		
		5. River basin of the Don.		
26	1938/9	Rostov on the Don	unknown	unknown
27	1941	Region from Stalin to Kharkov	individual cases	unknown
		II. North Europe		
28*	1924	Dalekarlia	unknown	lemmings
29	1929/30	South Norway: Telemark (first case, Valders, Hallingdal, Troendelag, Oslo Most in the north: Hattjeldal, south of the Roes-Vans-lake (66°) Most in the south: Mandal (58°), in the western part only one case in Odde (Hardanger Fjord)	50	lemmings, hares, field mice vectors: chrysops
30	1931	Central Sweden: villages for 12 km round Lindesberg (20 cases), Bollnaes (1), N.Edsbyn (1) and 11 cases scattered in central Sweden	31	hares, squirrels (insects)
31	1934	Villages in the northern part of Uppland and southern part of Gaevleborg: Soederfors and Gysinge (35 cases), Gaevle (6), Haemrange (4); Ockelbo (2), Lingbo (1), Falun (1), Filipstad (1)	48	hares
32	1937	Gaevleborg and surroundings of Bollnaes (confluence of Worna and Ljusna-Elf) for 50 km round. First cases: Moeckelasbo in the district Arbra (3) on 21st of July. Kilafors, Soederhamm, Ljusdal, Oslaettfors, Gaevle	115	hares vectors: 4 species of aedes and 1 Theobaldia
33	1938	Gaevleborg and surroundings	200	hares, vectors: gnats (aedescinereus)
34	1938	Lappmark: Arjeplog on the Stor-Afvan (Skelefte-Elf), most northern occurrence in Scandinavia until now (66°)	60	lemmings
		III. Central Europe		
35	1935/7	Moravian Basin: North East corner of the district Lower Danube (district Mistelbach and Gaenserdorf), even 1935 cases in Bernhardstal, Leopoldsdorf i. M., Fuchsenbichl. 1936: first case: Reintal. Main seat: Bernhardstal (44), Reintal (10), Rabensburg (5), Poysdorf (4), Poysbrunn (4), and 15 other villages. Of land Moravia, the district Hodonin, Mikulov, Vyskov, Brno, first case in Nova Charvatska Ves (20), Main seat: Postorna (47), Of Slovacia the districts Skalica, Senica, Malacky, Pressburg Individual cases: Zwettl, Znaim, Schwechat near Vienna, Graz, Koh-Fidisch (Burgenland)	about 600 200 of them in Lower Danube district 391 in Moravia and Slovacia	hares, bisam rats, field mice, Vectors: cats, ferrets
		IV. South East Europe and Asia Minor		
36	1935	Thracia: Valley of Kaynardsha	26	rabbits
37	1936	Thracia: Surroundings of the town Lueleburgaz in the valley of Kaynardsha. Principal seat: Turgutbey	153 (133 of them soldiers)	rabbits (hares) vectors: horseticks, flies, gnats (stream water)
38	1937	Thracia: 33 villages in the surroundings of Lueleburgaz (110 villages examined)	178 (85 of them soldiers)	
39	1937	Asia Minor: Konya (Dep. Konya)	4 butchers	unknown
40	1937/8	Asia Minor: Anatolian Highlands Ankara	6	unknown
41	1937	Wansee	6	unknown
		V. North Africa		
42	1933	Tunis	unknown	rabbits
43	1933	French West Africa	3	palm-rats

Note: The occurrences marked * are not confirmed by bacteriological or serological diagnosis.

PANDEMIC DISTRIBUTION OF THE INDIAN CHOLERA

1934 - 1943.

Translation prepared by:
U. S. Fleet, U. S. Naval Forces, Germany,
Technical Section (Medical).

Cholera, which in the beginning of World War I occurred among the forces of the Central European Powers in the Eastern Theater of Operations, appeared so abruptly that it resulted in a catastrophe of the greatest bearing due to the failure of the measures taken against it. This cholera epidemic was discussed immediately before World War II in a historical review by J. KAUP in the Muenchener Medizinische Wochenschrift 1938, page 1227. The comparison of the great losses of the Austro - Hungarian Army on the one hand, which was not vaccinated even after the occurrence of the first cases, and of the small morbidity and death rate of the German forces on the other hand, which were vaccinated immediately after the outbreak of cholera, revealed the efficiency of the cholera immunization.

After the experience gained during World War I it is now possible to avoid such a catastrophe by the repeated immunization of every soldier in due time. The problem is still to be solved whether or not it is possible to predict dangerous situations such as developed with the occurrence of cholera during the war between Austria and Prussia in 1866 in Central Europe and in the beginning and after the end of World War I in the eastern European countries for a certain period so that the necessary defense measures can be taken in time.

Concerning the outbreaks of Indian cholera, which for the first time was carried from Asia to Europe 110 years ago, it has been known for a long time that cholera is spread with certain periodical fluctuations from its original source in Bengal on the Ganges river to the adjacent countries where it may completely disappear, while in India itself it increases and decreases within the regular interval of several years. The close study of the various outbreaks throughout large areas, which for the first time was accomplished by STICKER, reveals the following 6 pandemics: 1. 1817 to 1823, 2. 1826 to 1837, 3. 1846 to 1862, 4. 1864 to 1875, 5. 1883 to 1893, and 6. 1902 to 1923. In a first study at the onset of World War II (Die Medizinische Welt, 14th edition, No. 39, page 994, 1940), I made reference to the fact that recently cholera has set out from India to a new, the 7th pandemic, which, however, has not reached the same violent character as the past outbreaks since the mass immunization was employed as a measure of defense in the non-Indian countries. The character of cholera as a wandering epidemic,however, can also be demonstrated for this recent cholera wave when its incidence is studied on geographical maps. Subsequent to a decrease of the number of cholera cases in India after the last years of the severe cholera epidemic from 1927 to 1930 to one fifth of the annual average, a new steady increase of the number of cholera cases became obvious during

the years immediately before the outbreak of World War II. During 1938 a considerable increase of the deaths from cholera occurred resulting in a new maximum of the annual morbidity curve (370,000 cases were reported with more than 180,000 deaths). I do not know whether or not these figures were exceeded by those of the famine year 1943, as no statistical material is available. It is however, established, that the recent outbreak of cholera was not confined to its proper origin on the Ganges river in Bengal and in Asam, but that during the recent years cholera has spread to an ever increasing extent beyond the boundaries of India all over Greater Asia and even throughout northwestern Asia.

The countries of Far India and the East Indian Islands are involved to a certain degree in all transitory advances of the Indian cholera epidemics. Throughout these territories cholera is also found in intervals of several years. The years of maximal lethality are always followed by years which are almost completely free from cholera. The greater the distance of the various territories from the actual epidemic focus, the less marked is the periodical return of cholera to these countries. In Siam from December 1936 on the number of cholera cases was continuously increased in connection with the increase of cholera in India, so that the monthly number of new cholera cases exceeded one thousand in February 1937.

From July 1937 on the cholera morbidity in the ports of the south Chinese coast and on the island of Hainan began to rise. The French colony of Kwang-chou-wang was involved in August. As a matter of fact at that time the entire Kwantung coast of China had to be considered as contaminated. In Portuguese Macao more than 350 and in Hongkong almost 1,000 victims were recorded in 1937.

In Shanghai, where the first cholera cases were recorded on 30 August 1937, cholera was spread around affecting 3,414 persons according to the official statistics. In the French concession in Shanghai, where the epidemic attained the climax on September 11th with a daily sick rate of 146 cases 300,000 immunizations were carried through. In the next year there was a new outbreak of cholera in Shanghai with 7,436 cases before November 1938 and with a death rate of 2,238.

The temporal coincidence of the years with the greatest lethality from cholera in India and French Indochina is very conspicuous. Here too, the most disastrous cholera epidemic of the last 30 years occurred in 1926/27 with more than 40,000 deaths (within 2 years). The number of deaths dropped at the same point of time at which cholera attained its maximum throughout the area of Assam. Simultaneously with the flaring up of cholera in India in 1934 a new severe epidemic broke out

in 1937/38 after an interval of about ten years. This new epidemic lasted from September 1937 (first case on September 7th in northern Indochina (Tonkin) near Haiphong; cholera was imported from the Chinese coast to the Thai-Vinh province) and a focus developed before October 1938 the morbidity rate being 20,000 with almost 15,000 deaths.

For a special reason this epidemic is of interest to us. In Indochina the greatest attempt of a biological prophylaxis ever accomplished during a cholera epidemic was carried through since almost the entire population of Indochina was vaccinated against cholera. With a population of 15 million persons 12,474,000 immunizations were effected. But in spite of this measure there is always the danger of a new outbreak of cholera, if the Indian focus runs over. In November and December 1943, 322 cases of cholera with 227 deaths were observed when it broke out in Haiphong.

In 1938 cholera flared up again along the entire south Chinese coast involving the south of China, namely the provinces of Kwantung, Kwangsi, and Honan to a particularly high degree. The first incidence of cholera was observed here in the month of May 1938. The epidemic also invaded Central China. In the eastern part of Kwantung almost 20,000 cases and 5,000 deaths occurred. In the north of China this cholera epidemic was spread as far as Tientsin, Taku, Korea, and the Manchurian towns of Dairen and Mukden.

To control the great cholera epidemic in northern China more than 8 million vaccine bottles were provided for the Chinese Government by the Board of Hygiene of the League of Nations. However, even in the year to follow, 1939, the epidemic did not completely subside. In the ports of the south China coast, in Siam, Hongkong, and in several other places new cases of cholera were observed in 1939, the number of which was not fully known when World War II broke out.

In several Japanese ports isolated cases of cholera imported from other countries were recorded (1937 in Hiroshima, Tokuyama, Kobe, Oku (district of Okayama), totaling 57 cases and 20 deaths). In 1938 cholera was observed in addition in Fukuyama, Okayama, and Wakamatsu.

After an interval of only 2 years following its spread to the southeast, cholera also invaded the northeast of the Asiatic continent. In northwest India where cholera is not endemic, an outbreak occurred in 1938. According to the reports of an epidemic in Hasset in the state of Swat, pilgrims from the United

Provinces and from Calcutta are said to have imported cholera in the month of June 1938. About 30,000 vaccinations ware carried through.

In May 1938 cholera had even advanced to Peshawar, the well known fortress of the Khyber Pass. The Afghan authorities took adequate prophylactic measures in time to prevent cholera from invading the Afghan territory. But although physicians and vaccine were sent to the frontier cholera broke out in Afghanistan. Nomadic tribes crossing the border were contaminated with cholera and brought it to the Afghan territory and to Kabul, the capital. Subsequently a general vaccination was carried through in Kabul, where 204,442 persons were vaccinated within one month with the result that the number of new cholera cases was considerably diminished and cholera disappeared from those districts in which the vaccination was made carefully. Before the end of November 1938 isolated cases occurred in Kabul. In the meantime, however, cholera was spread to Kandahar. From the beginning of the cholera epidemic (June) until November 23rd the number of the recorded cases of cholera was 3,291 with 1,710 deaths. In 1938 almost half a million persons were vaccinated, and on January 12th the Afghan authorities were in the position to announce that the cholera epidemic on the Afghan territoriy was extinct. According to recent reports there was a new outbreak of cholera in Afghanistan in the summer of 1939; 809 deaths were recorded during the period between July and November 4th 1939. In January 1940 a new outbreak of cholera was reported from Afghanistan.

In spite of all prophylactic measures cholera occurred throughout Iran in 1939 causing the death of more than 300 persons. The strict measures taken here at first prevented cholera from being spread a second time to the Iranian territory. However, a new outbreak of cholera seems to have occurred towards the end of 1943 which this time most likely was imported along the sea route through the Persian Gulf. In 1943 quarantine was imposed on the towns of Abadan, Bandar Shahpur, and Kermanshah. Simultaneously cholera seems to have occurred in Iraq, as quarantine measures were imposed on Basra.

In the course of the past century the Iranian Highlands were repeatedly the bridge upon which the cholera, being a migrating epidemic, regularly advanced from India to the European part of Russia. Starting from the coast of the Caspian Sea, which forms the northern border of Iran, cholera invaded Russia via Astrakhan on the mouth of the Volga river during its first great progress in the years 1830 and 1847. The recent reports suggest that during the present seventh pandemic outbreak cholera seems to be taking this route for the invasion of Europe. In August 1942 several cholera cases were observed

in Makhach-Kala and in Stalingrad. In September and October 1942 cholera occurred in Rostov on the Don river and in several small places of the Donez basin.

The second route for the great cholera invasions of the past century is that from the Persion Gulf and the Two-river-country Iraq through Syria to the Mediterranean basin and its European shores. In the course of the years 1884, 1891, 1903, and 1912, cholera regularly was spread from Baghdad to Syria. Recently this danger again became imminent during the summer of 1931, when there was an outbreak of cholera in Basra and several other places in Iraq, and when strict prophylactic measures had to be taken, such as the medical examination of all travellers coming from Iraq with special regard to vibrio carriers. During the last migration cholera arrived again at the critical point at which its invasion must be feared in the Mediterranean basin and its European coasts.

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PARATYPHOID A IN EUROPE

(1902 - 1939)

Translation prepared by:
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Paratyphoid A occurs in tropical and subtropical countries. Its area of distribution includes the entire Indo-Pacific area with India, Far India, the Islands of the East Indies (Insulinde), the southern parts of China and Japan. In these countries the infections with bacillus paratyphosus A (BRION and KAYSER 1902) constitute a rather considerable portion of the typhoid infections. In the Central American countries and in the southern and eastern states of the United States paratyphoid A also occurs rather regularly without appearing with the same regularity as f.i. in the above mentioned Indo-Pacific area. Only few data are available on the distribution of paratyphoid A throughout all the other non-European areas, as neither clinically nor bacteriologically has a sufficient and satisfactory distinction been made between paratyphoid A and the related organisms of the bacillus typhosus and bacillus paratyphosus B Schottmueller.

In the European territories paratyphoid A heretofore was regularly observed only in the Mediterranean countries. It is very likely that World War I, from 1914 to 1918, with the temporary transfer of a large number of non-European troops to the European territories promoted the spread of paratyphoid A throughout Europe. The literature reports a few isolated cases only for the period before World War I the geographical distribution of which is recognizable from the attached map. The increased paratyphoid A incidence after that war probably is not only to be traced back to the increased attention but to the improvement of the bacteriological and serological methods of diagnosis as well.

During World War I from 1914 to 1918 a large number of isolated cases of paratyphoid A occurred in Europe and small epidemics were observed in regions, where diseases due to bacillus paratyphosus A had not been observed previously (cf.map). This particularly applied to the German and French battle front from Metz to Reims, where paratyphoid A occurred on both sides and, in addition, to the Austrian-Italian battle front, the Saloniki front, and Roumania. In the Eastern Theater only isolated cases occurred. In all the above mentioned battle areas the highest paratyphoid A incidence was attained in 1916 although the same conditions favorable to the outbreak of paratyphoid A were offered by the events in 1917 and 1918. Altogether 4135 paratyphoid A cases were found throughout the German Army. The comparable figures of the different theaters of war are given in Table 1.

Table 1.

Diagnosis through bacteriological examination

Area:	Year	Paratyphoid A	Paratyphoid B	Typhoid Fever
I. Balkan:				
1. Bacteriological diagnosis of the field lab.Ueskueb	1915	4	52	83
	1916	422	327	125
	1917	372	343	49
2. French Levant Army December	1915	226	28	82
to September	1916			
June to December	1917	100	38	59
II. Western Theater:				
1. German Forces	1914	26	156	1070
	1915	100	889	2163
	1916	570	3149	433
	1917	382	5485	212

Percentage of Paratyphoid A in relation to all typhoid diseases:

Area:	Year	Paratyphoid A	Paratyphoid B	Typhoid Fever
Western Theater:				
2. French Forces	1914	-	-	-
	1915	10 %	-	-
June	1916	92 %	-	-
December	1916	20.2 %	-	-
	1917	40-55 %	10-33 %	25-30 %
	1918	7-15 %	15-25 %	60-75 %
III. Italian Theater:				
Austrian Forces				
End Nov.	1915	first cases of paraty-A		
beg.Dec.	1915	20-25 %	20 %	50-55 %
End Dec.	1915	50 %	15 %	35 %
Feb. to June	1915	75 %	15- 20 %	5-10 %
July to Nov.	1916	20-45 %	50- 60 %	5-10 %

There was no spread of paratyphoid A after World War I. Only a very small number of scientific publications supply information on the occurrence of paratyphoid A throughout Europe during the period after World War I.

North of the Alps paratyphoid A is and always was rare and occurred with a certain regularity only in those places which have to be considered as the centers of traffic with the Mediterranean countries or with the oversea areas of distribution, such as f.i. Amsterdam, Rotterdam, Hamburg, Munich, Breslau, Paris. In most of the cases the infection with paratyphoid A was due to a stay in the tropics or the subtropics.

North of the 56° latitude no case of paratyphoid A was observed except for one case in Petersburg (Leningrad).

Within the territory of Greater Germany only 2 rather great paratyphoid A epidemics have been observed so far. During the epidemic in Koenigsberg (1922), involving 244 cases, 124 cases gave a positive serological reaction for paratyphoid A and bacillus paratyphosus A was isolated in 24 cases. The origin of this epidemic was not recognized. The last epidemic of paratyphoid A happened in Vienna in March 1939, in the barracks where 121 cases fell sick with it, one of which was fatal. Bacteriological proof was established in two third of the cases only, usually through a blood-agar culture medium. Here, most likely the infection of the soldiers partaking of the food with paratyphoid A was effected by lettuce imported from Sicily by a Vienna vegetable dealer. This latter occurrence shows the exposure of Germany to the danger of an occasional spread of paratyphoid A from the Mediterranean countries. For Italy, Croatia, Albania, Greece, French North Africa, and Syria paratyphoid A occurs as an endemic which, however, does not attain the extent of the paratyphoid A incidence throughout eastern Asia. With the available statistical material and estimations the proportion of paratyphoid A to the total number of the typhoid diseases of the intestine after the years following upon World War I is given in Table 2 attached to this article.

Table 2.

Proportion between Paratyphoid A and All Paratyphoid Diseases after World War I.

Area	Year	Paratyphoid A	Paratyphoid B	Typhoid Fever
Black Sea Area: Rostov (Don)	1926	5 - 10 %	5 - 8 %	84 %
Mediterranean Basin: French Mediterranean coast	(estimation)	2 %	18 %	80 %
Southern Italy (Province of Bari)	1933-38	19.9 %	12.1 %	68 %
French North Africa (Colonial Army)	1929-37	16 %	40 %	44 %
Croatia: Area of Osijek and Susek	1931-35	23 different strains were cultivated	15 strains cultivated	
Remaining parts of Croatia	1931-35	9 strains cultivated	48 strains cultivated	

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PARATYPHOID C THROUGHOUT EUROPE AND THE MEDITERRANEAN BASIN

Translation prepared by:
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Paratyphoid C is the term for the typhoid diseases of man caused by organisms of the group Bacterium suipestifer.

It progresses under the symptoms of a mild typhoid fever, the fever lasting usually less than ten days. As a rule paratyphoid C does not seem to be accompanied by intestinal ulcers. The post-mortem inspection reveals typhoid granulomata in the spleen, the liver, and in the mesenteric glands. The symptoms of paratyphoid C are rarely observed in the pure form, as it usually is an infection associated with other infectious diseases (such as malaria, relapsing fever, infectious hepatitis, dysentery, etc.). In such a case the paratyphoid C infection shows suppurative complications as the only symptom.

Paratyphoid C must not be confused with the acute gastroenteritis caused by Bact. suipestifer, which usually occurs as a group infection after eating contaminated pork and sausages made from pork. The term paratyphoid C should not be applied for such diseases nor for the enteritis due to other bacilli of the Salmonella group.

Two types of bacilli of the suipestifer group may be considered as the causative organism of paratyphoid C; these are the type Erdzindjan or Orient (Salmonella paratyphi C) and the type Kunzendorf (Salmonella cholerae suis var.kunzendorf).

I. Paratyphoid C of the type Erdzindjan was found during World War I in the Balkans and in the Near East. During the period immediately after that war sporadic cases were found in the border areas of the eastern Mediterranean basin. During World War II it was not observed throughout this area. Some observations made in Volhynia suggest that during World War I paratyphoid C also occurred in the Eastern Theater of Operations. It was of a certain importance during the years of famine and epidemics in Russia from 1919 to 1923, where it occurred under the term paratyphoid N, which was observed particularly as a complication of relapsing fever. However, the diseases discussed under the term paratyphoid N are not identical as to their bacteriological cause, part of them being due to the Bact. enteritidis Gaertner. Only a small fraction of the cultivated organisms was so thoroughly examined that they were recognized with certainty as belonging to the type Erdzindjan. In one case (in Rostov) the type Kundenzorf was found.

The center of the paratyphoid C incidence was the southeast of Russia. The cases found in Leningrad principally seemed to affect those persons who had arrived from the southern territories. In the course of World War II Erdzindjan strains originating from PW's were sometimes cultivated (HOHN) without detailed epidemiological data being available.

No certainty is established as to the epidemiology of the paratyphoid C caused by the type Erdzindjan. As this organism has not been found in animals so far, it is permissible to assume that it is communicated directly from man to man. The contamination through certain insects was also discussed, but no proof is heretofore established as to the way of the infection.

II. The type Kunzendorf was not recognized as the causative organism for paratyphoid C during World War I. It principally was found during the period between World War I and World War II in the Balkans, where it was observed again during World War II.

With the heretofore available methods this organism cannot be distinguished from the organism of hog-cholera and of the acute gastro-enteritis of man due to eating contaminated pork. It is not proven as yet whether or not paratyphoid C of the Kunzendorf type is connected with swine as the source of infection.

It is still a matter of doubt whether or not the occurrence of paratyphoid C throughout the Near East and throughout Russia should be considered as a geomedical entity. In addition two more such areas exist, one of them being situated in the East Indies, the other one along the northeastern coast of South America.

For the evaluation of the chartographical design one must bear in mind that the diagnosis paratyphoid C is only possible if the clinicians and the hygienists cooperate sufficiently. The places given in the chart, therefore, are the places, where paratyphoid C has been found incidentally and they should be considered as the first data of the actual distribution of this disease. However, it is worth noting that the diagnosis was established during World War I on both sides of the front in several places independently in the Balkans and in the Near East on the one hand, and that on the other hand paratyphoid C was not observed in Germany and in the Scandinavian

countries, where the research in paratyphoid and enteritis was particularly intensive (except for 1 case in Mecklenburg).

Therefore, the answer must be found for two geomedical questions:

1. What is the reason for the absence of paratyphoid C cases in northern, central, and western Europe?

2. Why has the type Erdzindjan which previously prevailed in the southeast, given way to the type Kunzendorf?

These two problems cannot be solved before the following two epidemiological questions have been answered:

1. Through which way is the paratyphoid C of the type Erdzindjan communicated?

2. What is the proportion between the paratyphoid cases of the type Kunzendorf and the corresponding infections of the swine and of the gastroenteritis of man?

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DISTRIBUTION OF THE SANDFLIES

(GENUS PHLEBOTOMUS)

IN EUROPE

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The cartographical description of the distribution of the genus Phlebotomus in Europe is intended to afford a synopsis of the hazard of those regions in which the occurrence of diseases of which the Phlebotomus is a vector, must be reckoned with. Furthermore, the map is intended to make possible a judgment of the probable situation of the northern boundary of the distribution area of the Phlebotomi. It must be considered that the present principal distribution area of the genus Phlebotomus in Europe - the Mediterranean region - for this genus which was distributed throughout Europe in the tertiary age, is only an area of retreat whose northern boundary is determined above all by climatic factors. To illustrate these conditions the course of the 10° C. annual isotherm is indicated on the map. On the other hand the various species of the genus can probably spread farther than the limited flying range of the single flies suggests. This is proven by the wide distribution of almost all species of the European Mediterranean area which have spread from the western Mediterranean coasts to northern India, even to the eastern Chinese coast. This is also indicated by the fact that some species (e.g. Ph. perniciosus and Ph. sergenti) are distributed in French North Africa southward only to the edge of the desert (do not reach Biskra for instance), but then possess again island-like distribution areas at some elevated places in the middle of the Sahara.

Even if it must not be regarded as impossible on the strength of such reflections that a few species of the genus may occur also in the north of the present known northern boundary of the distribution area, it is on the other hand practically impossible that these species have any epidemiological importance far outside the distribution area known today. Today the genus Phlebotomus is too well-known, so any of its species can occur but only rarely and isolated, in European regions from which they have not yet been reported.

On the map the distribution areas known for those species which are known to attack man have been entered. The species of Phlebotomus occurring in the European Mediterranean region may be divided into two groups of species. One of these, the minutus-group (called also sergentomyia or prophlebotomus) finds its blood-donors

almost exclusively amongst the reptiles and thus is of no importance for man. It has not been considered on the map. By the way, its distribution area nowhere in Europe reaches the distribution area of the other group of species indicated on the map. The other group of species (subgenus Phlebotomus in a stricter sense) comprises only species which attack man in addition to other mammals (and sometimes birds). In this group of species, a series of species has been distinguished which vary only in very slight characteristics and obviously replace each other in various geographical areas. It is suitable to separate them in a few form-groups (it is not yet certain whether the forms of these groups to which the special names have been given, must be regarded as races or as different species). These are:

Ph. papatasii Scopoli (distributed in the whole Mediterranean region and from there up to North India).

Ph. sergenti Parrot (with the forms sergenti Parr. and alexandri Sint. in the whole Mediterranean region, caucasicus Marz. in Transcaucasia, Iran, Russian Central Asia, and mongolensis Mewst. in China and perhaps in Russian Central Asia as well).

Ph. perniciosus Newstead (with the form perniciosus in the districts west of the Adriatic, the form tobbi Adler, Theodor & Lourie in the Mediterranean countries adjoining in the east, and the forms kandelakii Schtschur in Transcaucasia, Iran, and Russian Central Asia).

Ph. perfiliewi Parrot (in the eastern European Mediterranean countries Italy and Algeria, and the form transcaucasicus Perf. in Transcaucasia).

Ph. major Annandale (with several less important forms distributed from North India and Russian Central Asia to Italy, in Southern France and Spain represented by ariasi Tonn.).

Ph. chinensis Newstead (with several less important forms distributed from China and North India to the eastern Mediterranean region, in Italy and France represented by larroussei Lang. & Nitz.).

These forms have a varied spidemiological importance. Ph. papatasii is generally regarded as the vector of pappataci fever. It must be considered, however, that the positive recognition, particularly of the females, has been made possible only recently. For this reason and for others mentioned below, it is no longer possible to affirm that the species with which the first experiments of transfer were made, was actually Ph. papatasii. Ph. perniciosus, Ph. sergenti, and Ph. major (in the plain of the Dalmatian coast) are suspected to be the other vectors. It is perhaps not accidental that pappataci fever is more important in the eastern Mediterranean region than in the western section in which Ph. papatasii seems to be of less importance (also Ph. major in the typical form evidently does not occur there), and in which Ph. perniciosus is said to be much more frequent than Ph. papatasii at some places and at certain times.

Ph. papatasii and Ph. sergenti (both or one of the two species at other places) are called the vectors of the oriental boil, Ph. perniciosus (in the western Mediterranean region) and Ph. major and chinensis (in the eastern Mediterranean region) of Kala-Azar.

Just as in their medical importance the single species considerably differ in their way of living as well. Ph. papatasii, for instance, remains in the interior of living- and bedrooms even in daytime and bites only in them. The other species, however, visit the living- and bedrooms only in search of food and bite in the open as well, as far as known until now. In contrast to Ph. papatasii, they are attracted by artificial light and differ from each other also by the time of their flight into the buildings. If thus there is shown a denser hatching of some regions on the map (as expression of greater density of the species) one must not be lead to expect in these regions a greater individual frequency of the sandflies at any rate; it may be supposed on the other hand that the importance of the Phlebotomi is particularly great in these regions, since the single species present there are, as it were, both temporally and locally represented in their attacks on man. This is also of importance for possible measures of protection and control.

The density of hatching in the single regions, however, is partly based on the degree of their exploration. Today, the best explored countries are Spain, France, Italy (particularly the environments of Naples, Sicily, and Malta), French North Africa (Algeria), Serbia, Greece, Crete, Palestine, Syria, and Russia. Turkey, Italian North Africa, and Egypt are explored to an absolutely insufficient degree. It is certainly no accident that near the probable northern boundary only one or a few species at a time have been observed, and the elsewhere most frequent species Ph. papatasii is not one of them: in the very thoroughly explored France, Ph. papatasii is known only at a few places on the southern coast. The findings reported from Switzerland (Vaud, Ticino) probably refer to Ph. perniciosus. Even the findings in the Po-plain (Torino, Milano etc.) have been made a long time ago. On the Balkan peninsula, the northern boundary of the species is near Ristovac according to recent data (it has been recently reported also from southern Bulgaria). Older data report the species from Roumania as well (Mehadia, Walachia, Iasi). It is urgently necessary to examine the Phlebotomi occurring in Roumania once more as regards the species to which they belong. Recent reports from Roumania (Bucharest) speak only of the Ph. chinensis. Also from the Dalmatian coast (it was proven there the first time that pappataci fever is transferred by Phlebotomus!), only Ph. major has been recently reported. Ph. papatasii has not been found in the north of the Krym; in the Caucasus, Georgievsk is the most northern reported location.

The species occurring most toward the north are in France Ph. perniciosus and Ph. larroussei, on the Balkan peninsula Ph. perfiliewi (Szeged, Hungary), in Odessa and on the lower Dnepr Ph. chinensis and Ph. sergenti, and in the Caucasian region Ph. major (Armavir, most northern reported location of the genus Phlebotomus in the Soviet Union according to SERGIEV). Among the mentioned northern forms, Ph. perniciosus is a pronouncedly western species, which has not been frequently found (in the form tobbi) in the eastern Mediterranean region. It is perhaps not accidental, however, that Ph. perfiliewi, the species reported most northward on the Balkan peninsula, is closely related with Ph. perniciosus. Ph. larroussei is closely related with Ph. chinensis which has been found in Roumania, in Odessa, and on the lower Dnepr. In addition

to Ph. sergenti, also found in these regions, Ph. chinensis is the only one of the species occurring in the European Mediterranean region, which is spread up to China, though it never passes the 45th degree north latitude.

In summary, it can be affirmed that an occurrence of the genus Phlebotomus far to the north of the previously known distribution area (apart from possible insignificant islands of distribution) is extremely improbable. If a few species should occur farther northward, these are probably Ph. chinensis, Ph. major, or Ph. sergenti (less probably Ph. perfiliewi), which are active at night, do not visit living- and bedrooms in daytime, and of whose epidemiological importance (as far as pappataci fever or, more generally, the "slight summer fevers" are concerned) nothing positive is known. Thus, it is practically impossible that Ph. papatasii, whose epidemiological importance is most certain, as generally believed, should occur outside the distribution area of the total genus indicated on the map.

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OCCURRENCE OF PLAGUE IN THE NEAR EAST

1917 - 1941.

Translation prepared by:
U. S. Fleet, U. S. Naval Forces, Germany,
Technical Section /(Medical).

For many centuries the Near Orient, the area situated between the two oldest origins of the plague, that is between the Central African and the Central Asiatic mountains was always the preferential location of plague epidemics. From the most extensive persistent plague focus in Higher Asia with its western plague nests in the spurs of the Hindu Kush massif the plague within several centuries has repeatedly invaded the adjacent countries of the Near Orient, Afghanistan (Herat 1877/78, Kandahar 1883/84), Chorassan (Mashhad and environments 1881, 1887, 1890), and the Iranian provinces Gilan (Resht 1877: 2000 deaths), Kurdistan (1878, 1881, 1883) and Seistan with the town Turbeti-Scheich-Djama and Avaz (1905/06). These areas must be regarded as exposed to plague even today, even if no reports of plague in Afghanistan and Iran were available during the last decades.

The very old persistent plague focus on the Northwest shore of Lake Victoria (cf.map) according to STICKER constitutes the source of the former occasional occurrence of plague in Egypt and in the North African colonial countries from Tripoli to Morocco. In recent times the Nile valley must be considered as a new plague focus of the 2nd order on account of the regular annual occurrence of plague in this area.

In the Near East two persistent plague foci exist according to STICKER: 1. One of them is situated in the Highlands of Asir between Nejd, Hejaz and Yemen, southwest of Mecca, the district of the Beni Scheir, of which there are no reports since those made by STICKER. 2. The other one is located in the mountains around Mt. Ararat with the highlands of Armenia, Azerbeidzhan and Kurdistan, which according to STICKER were a persistent focus of plague before 1902. While in these two areas only very isolated cases of plague occurred during the past years (as e.g. in Karabach 1931), and only few epidemics in the adjacent regions such as the epidemics in Jidda 1897/98, 1906/07, Aden 1900, 1905, 1913, 1917 and 1928), in present times a new plague source of the 2nd order has been formed in the Near East, namely in Iraq, which originated from this focus, and where even nowadays cases of plague occur annually. Recently (1940/41) cases of plague were reported in El Koweit.

Of the most important plague foci of the 2nd order which became famous during the past century, namely the ports of the Levant, only Beyrouth was left with a few isolated cases of plague, without the epidemic spreading from here to Syria and Lebanon. Except for a few isolated cases which were imported to the ports Antalya, Izmit,

Istanbul, Trabzon (Trabezond) Turkey has also been free of plague epidemics during the past decades (since 1871).

Egypt, which according to STICKER was invaded again by plague in April 1899 from Alexandria after plague had been extinct in that country since 1846, in recent times is the most important plague focus of the Near East as regards the area of spread and the number of cases. Plague has its foci in the Nile valley and claims a great number of victims among the rural population of many provinces. Almost every year small or more extended epidemics break out which on four occasions amounted to more than 1500 cases within one year (1908, 1911, 1916, and 1923). Usually only sporadic cases of plague occur and small epidemics against which energetic measures are taken immediately. It is primarily due to these watchful measures that plague has not spread further in the Nile valley. During the past 15 years (1926 - 1940) the greatest number of plague cases occurred in the provinces Asyut, Minia, and Girga. Several times cases were also observed in Garbia, Bani Suef, Manfalut, Menufia, and Giza. Only two to three times within 15 years was it observed in the provinces Aswan, Beheira, Fayum and Qena.

Cairo has remained free of plague from 1899 unto this day, despite the fact that isolated cases of plague were imported altogether 16 times during the past years.

The Anglo-Egyptian Sudan has also always been free from plague since 1899 although the plague focus of Uganda is not far from it.

H. J. JUSATZ.

DISTRIBUTION OF THE FEVER-MOSQUITOES IN WESTERN AND CENTRAL ASIA

Translation prepared by:
U. S. Fleet, U. S. Naval Forces, Germany,
Technical Section (Medical).

The map is intended to show the occurrence of the most important vectors of malaria in Western and Central Asia. The possible distribution in the less known regions is considered as well.

Anopheles elutus (6) *) is the most frequent species in the Near East and in the Balkan peninsula. It breeds in warm, and even in salty water and thus is frequently observed at the coast. Very important vector!

A. maculipennis (1) has a vast area of distribution through the whole of Europe, from the north (Arkhangelsk) to the Caucasus, from Turkey through Syria, Palestine, northern Mesopotamia to Persia. The larvae live in a similar way as those of A. elutus (swamp-breeders), and also stand water containing slight amounts of salt, but decrease in the southern region in favor of A. elutus. In Turkey, A. maculipennis is limited to the highlands, but also haunts brooks and thus becomes a brook-breeder. This work pays no special attention to the single species of A. maculipennis, since examinations in this line are still incomplete in Western Asia.

A. superpictus (2) spreads from the Mediterranean region through Iran and Turkestan to India (rare in Egypt). Shallow mountain-streams are preferred breeding-places. The mosquitoes greedily bite during dusk and night and are considered as very important vectors of malaria.

For A. superpictus and A. elutus, Turkey forms a central area, from which the two species extend into the adjoining regions. The fauna of Macedonia is closely related to that of Anatolia; both regions form a biological unity. Also with regard to these regions it can be said that years with large rainfall favor swamp malaria by fostering the breeding-places of elutus and maculipennis, that dry summers, on the other hand, reduce these and favor mountain malaria, because of the fact that the rivers dry up but small rivulets are more easily conserved in the mountains and thus give rise to typical breeding-places of superpictus.

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*) The figures in brackets indicate on the map the respective species of Anopheles. Rare species have been inserted in brackets on the map.

A. bifurcatus (3) occurs frequently in wells even in southern Turkey; in Palestine it is a typical cistern-breeder.

A. hyrcanus (5) has an extensive area of distribution in south Europe, western Asia, Caucasia, Persia, Turkestan, India to China and Japan. The larvae prefer shallow stagnant water with rich vegetation and even slightly salty water. They avoid muddy water. The mosquito is a free land insect (wild mosquito). In the Caucasus it may be regarded as a vector.

A. plumbeus (4) is chiefly distributed in the Caucasian region and is at most of local importance.

Map 1. Spleen indices in Palestine
Territories infected with malaria are hatched

From the west two species extend to the area shown on the map:

A. algeriensis (7) through all western Asia. It is absent in Arabia and south Russia. We point out here its occurrence in Germany (in the north up to Mecklenburg). A typical free land mosquito without any practical importance.

More toward the east is found:

A. pulcherrimus. It has its area of distribution from northwest India through Tadzhikistan, Uzbekistan, Turkestan, Turkmenia (Transcaspia), Caucasian region to Mesopotamia (particularly frequent). It breeds in shallow ponds covered with vegetation, occasionally in rain-pools as well as in rice-fields. It is active at dusk. The mosquitoes are attracted by light. As an inhabitant of the steppe, it has a particularly great flying capacity and a great power of resistance against dryness. A. pulcherrimus hibernates as a larva and is probably an important vector.

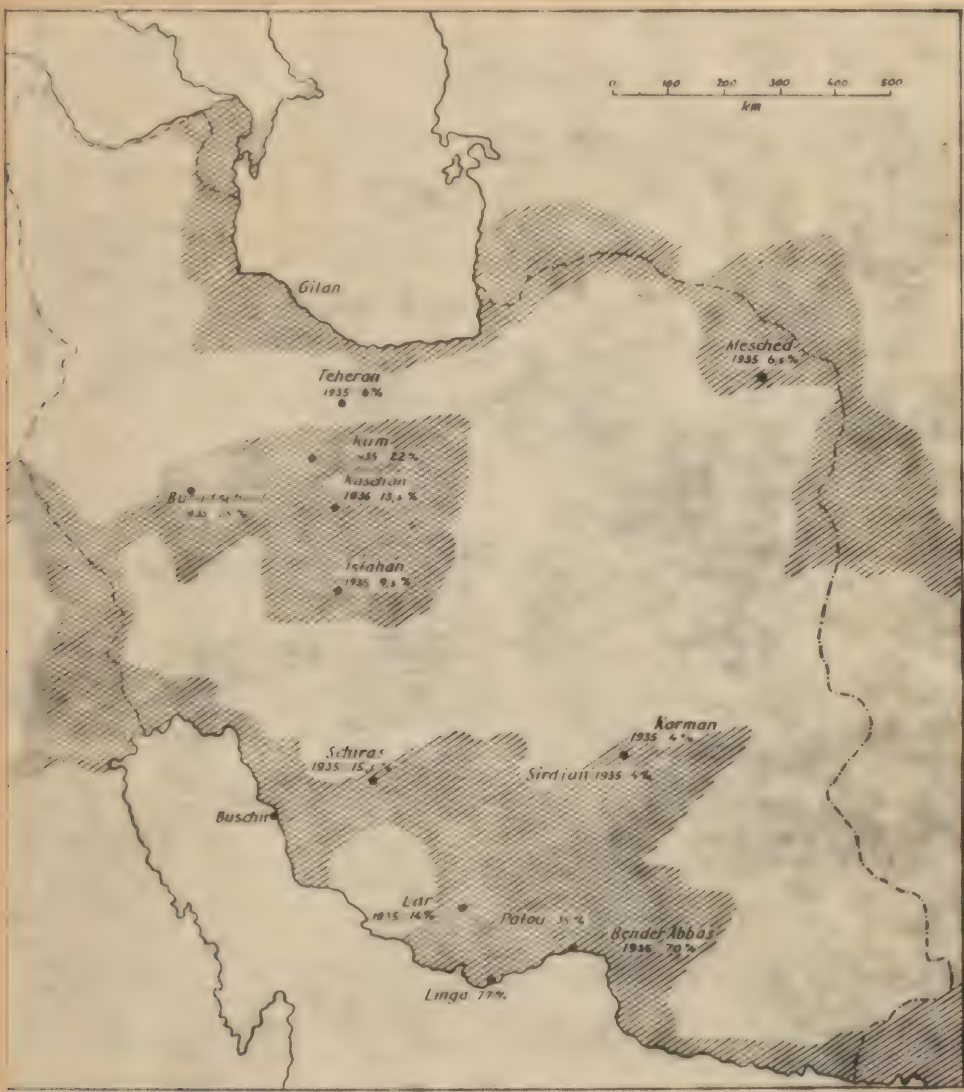
From north Africa the following species extend:

A. sergenti (13) has its principal area of distribution in the southern Mediterranean area, extends to Palestine and is no longer observed in Turkey. The larvae live in vegetation covered banks of ponds and lakes in sunshine. They avoid water containing salt. It easily penetrates into houses and is probably a serious vector in Palestine and Egypt.

A. multicolor (14) extends from north Africa through Egypt, Syria, and Iran to northwest India. The larvae live in small pools, wheel tracks, and hoofprints, even waste waters and they like salt particularly. They stand a salt percentage up to 6%! The flying capacity of the mosquitoes is considerable (up to 13 Km.!). A. multicolor is regarded as a vector of malaria in Egypt.

A. pharoensis (15) does not reach so far: Toward the north to Syria, towards the east to Mesopotamia. It chiefly breeds in swamps, rice-fields, and papyrus-

swamps. Completely stagnant water with rich vegetation is characteristic for it. It has been recognized as an important vector in the Nile region.



Map 2. Spleen indices in Iran
Regions infected with malaria are hatched

In southern Arabia, numerous Central African species occur, whose northern and eastern boundaries of distribution are not yet sufficiently known. As important vectors we mention A. funestus and A. gambiae. On the map, the species occurring in the southern section have been entered.

From India, some species spread to north and west, their area of distribution in eastern Iran and Afghanistan is not yet sufficiently known.

A. stephensi (10) extends to the Persian Gulf and thus reaches Mesopotamia. A. stephensi is considered a very important vector of malaria.

A. turkhudi (9) extends through southern Arabia to the Anglo-Egyptian Sudan. Nothing positive is known about the practical importance of A. turkhudi.

In Afghanistan, the occurrence of Indian species is to be expected. In addition, various eastern and northern malaria-mosquitoes penetrate from the other adjoining regions. The following species must be reckoned with: A. superpictus, A. pulcherrimus, A. stephensi, A. hyrcanus, A. sergenti, A. multicolor, and A. turkhudi. In the north-western corner, serious tropical fevers occur, even in the area of Mashhad which extends to Afghanistan through the north Iranian border mountains. In the southwestern part, serious tropical fevers occur again.

As regards Palestine, exact work is available (see special map with indications of spleen indices and areas of distribution). In the coastal region and in the valley of Esdrelon tertiana is predominant, around the lake of Nazareth quartana. The whole valley of the Jordan river, the town of Tiberias excepted, is largely infected with malaria. The Naamin River (Nahr Na'amen) which flows into the Bay of Acre, is very dangerous! Affule and Haifa are usually rather free from malaria, but are seriously infected with pappataci fever.

A special map informs about Iran. The regions on the Caspian Sea have a large rainfall and are partially swampy. The coast has numerous lagoons. In the provinces Ghilan and Mazenderan there are many rice-fields, and

there is a malignant malaria, also along the rivers Kura and Araxes and along the further coastal region, there are great endemic malaria-areas, as well as on the southern coast and in the Persian Gulf (Shat-el-Arab = delta of the Euphrates and Tigris Rivers). The port of Bander Abu Shehr (Bushire) is regarded as particularly intensely infected. From May to September tertiana, from August to October tropica is said to be predominant. Malaria then spreads along the coast and passes over into the region of Baluchistan. In the interior of the country there are numerous endemic foci, fostered by widely spread subterranean canals and salt swamps. Despite its altitutde (1,700 m.), Shiraz is intensely infected with malaria. Malaria usually does not reach altitudes higher than 2,000 m. Also all Mesopotamia is considered largely infected with malaria, particularly in the place of pilgrimage Karbala, there is a high mortality of malaria. Only the oil regions are relatively healthy, since the waters there are covered by a thin layer of oil and thus the malaria mosquitoes cannot live.

E. MARTINI and J. HLISNIKOWSKI

OCCURRENCE OF MALARIA AND DISTRIBUTION OF ANOPHELES IN TURKEY

Translation prepared by:
U. S. Fleet, U. S. Naval Forces, Germany,
Technical Section (Medical)

1. The drawn out boundary lines indicate the boundaries of Vilajets (Administration Districts) which are only finely dotted in the map. They are specially marked only with those Vilajets which form the center of an area of malaria control. Such a center often reaches farther than the Vilajet boundaries, then it is marked with interrupted lines in its approximate outlines. In other cases, part of those Vilajets does not belong to the control area, because it is not much infected with malaria, then it is also marked with interrupted lines. Furthermore, the control stations are indicated by dots, the centers by spot with a little flag. The Roman numbers I-IX are explained on the left side, X-XVIII on the right side.

Since in the course of time the control areas are extended, reorganized, or subdivided, an exact representation of the present condition without consulting the government files is impossible. The data are based, above all on the lectures of Asim Arar and Serafettin Atamanoglu at the 3rd Congress of Tropical Medicine and Malaria in Amsterdam, and on the lecture of Hussameddin on the 2nd International Malaria Congress in Algiers. The representation is a summary one. Districts only slightly infected with malaria and thus not included in the control zones have not been particularly marked.

The first letters of the towns with malaria-stations have been entered. These are:

Trakya. Edirne: Lueleburgaz, Uzunkoepruе, Hayrabolu, Corlu, Kesan, Galebolu, Istanbul. Kocaeli: Karasu, Adapasari, Hendek, Duezce, Sapanca, Soeguet. Bursa: Yalova, Karacabay, Jenisehir, Inegoel, M.Kemalpasa. Balikesir: Bandirma, Manyas, Ezine, Edremit. Eski-sehir: Mihaliccik, Sivrihisar. Manisa: Akhisar, Menemen, Karsiyaka, Turgutlu, Salihli, Alasehir. Aydin: Torbali, Civril, Nazilli, Denizli, Karahayit, Bagarasi, Milas, Koizegiz, Fethiye. Samsun: Bafra, Carcamba, Terme. Kars: Igdir. Ankara: Tosya, Ilgaz, Cerkes, Cankiri, Etimesut, Keskin, Polatli, Haymana. Kayseri: Yerkoey, Pinarbasi, Develi. Diyarbakir. Konya: Afionkarahisar, Cihanbeyli, Aksaray, Akcehir,

Ilgin, Beysehir, Eregli, Karaman. Maras: Goeksun, Pasarcik, Islahie. Adana (Seyhan): Kozan, Kadirli, Osmaniye, Ceyhan, Doertyol. Icel (Mersin): Tarsus, Silifke, Anamur.

2. The hatching indicates the general degree of malaria infection: large interrupted hatching: "malaria present, in part to a considerable extent", uninterrupted hatching "serious malaria", cross-hatching "very serious malaria". Particulars see 5. Some smaller regions which are completely free from malaria, e.g. those with altitudes higher than 2,000 M., are included in the hatching, as well as some smaller, healthier districts are in the cross-hatched areas.

3. The numbers in italics entered on the map refer to the species of Anopheles, as explained in the list beside the map. As on other maps, the data express the places examined rather than affording a real notion of the distribution of the species. Apart from some particularly hot districts and some salt desertlike regions as well as very high altitudes, A. maculipennis occurs practically everywhere in the country.

4. The legends left and right of the map indicate in their headings number and name of the control-districts. Below them, on the right side, there is, in large-faced type, the parasite index of the control area according to the work of Asim Arar. The index is found by drawing blood-drops from large numbers of persons and by examining them for malaria parasites. The figure of the positive findings, divided by the total number of the persons examined and expressed in %, is the parasite index. Here, it has been obtained from many thousands of examinations through several years in every Vilajet. The malaria-rose beside it corresponds in the numbers of mm. of its diameter to this index. It is subdivided in sectors which correspond to the proportion of the three principal kinds of malaria and to the mixed infections (chiefly tertiana + tropica parasites). The figures on the left side express another index: the average annual figure of the persons found infected with malaria in the respective control area, divided by the total number of inhabitants of the central Vilajet in 1935 (census of the people), again expressed in %.

5. These very indefinite indices also form the basis of the hatching, and that as "malaria present" everything up to 12 % included, as "serious malaria" index between 12 and 25 %, and "very serious malaria" more than 25 %. The first step will have to be subdivided in a future work. The difference of the Vilajets appears much more distinctly in the figures on the left than in those on the right.

This is due to the following fact: The figure of persons infected with malaria (No.4) comprises in addition to those recognized as germ carriers during the blood-examination also those whose infection with malaria is only observed on the spleen, and partly probably cases which have become manifest purely clinically. Thus, it is more complete and thereby larger. But it refers not only to the persons examined but to all the population among which these cases have been found (if control area and Vilajet approximately coincide). If small portions of a Vilajet have not been included in the control, they are usually mountainous or half-desertlike and thus thinly inhabited regions, whose much better health hardly affects the Vilajet average because of the small numbers of inhabitants (Adana, Aydin among others). On the whole, the sentence is true for the countries with hot climates: "Where there is plain and water, there is luxurious fertility, dense population, economic prosperity and considerable malaria". Even if during the establishment of the control centers chiefly the economic importance has been decisive beside malaria conditions, both are frequently in the same line. If the not included and thus healthier regions are large and more densely inhabited, they not only decrease considerably the index on the left as contrasted to the index on the right during the computation of the figures, but even more than is actual since the cases of malaria occurring in these regions have not been included in the computation. In spite of that, the exaggerated differentiation of these figures is advantageous, on the whole. Istanbul shows how

differently the two indices indicate: The 44,000 inhabitants of the 18 villages under malaria control have a parasite index amounting to 6.2 %, but they represent only one twentieth of the inhabitants of the Vilajet. Thus, the infection referred to the total district of Istanbul, lies far below 1 %, and this figure is of more practical import. Only with the new centers in Kars and Diyarbakir, the figures on the left are deceptive, since the greater part of the Vilajets is not yet under control there. For this reason, this index is much lower today than it will be in a few years (in 1939, more than 70 % were infected among 21,000 persons examined of the Vilajet Kars, more than 40 % among 23,000 persons of the Vilajet Diyarbakir. Also in Konya and Kayseri the infection with malaria in the proper malaria control area is in part considerable).

However unstatistical this index is, it gives the more practical clues. On the whole, the majority of the regions endangered by malaria and economically important in the west are under control, and the control areas, which run along the lines of communication, adjoin approximately. Today the portions seriously infected with malaria of 31 of the 62 Turkish Vilajets are under control. Only the mountainous and thus healthier parts of the country, particularly the east are not under control. The most serious malaria is observed in the lowlands of the hot southern coast. In the north it is not quite so serious even on the sea coast, and in the highlands, it is on an average not so frequent as in the lowlands. The proportion of the tropica in total malaria and thus the danger of life by malaria usually follows the same rule. Despite that one finds some very seriously infected towns and villages in the highlands even in altitudes higher than 1,000 M.

In addition to the local average summer temperatures malaria is determined by geomorphology and the frequency of vectors is chiefly based on it. For this reason, plains are usually more infected with malaria mountains are healthier, high altitudes even completely healthy. Malaria which occurs in altitudes of

1,700 M., is often not autochthonous but is obtained during seasonal work in lower altitudes. The local differences, which may be of considerable practical importance might have been entered only according to official Turkish data in maps on a scale of 1 : 1 million or less. Even some smaller districts e.g. near the coast which are doubtlessly seriously infected with malaria and might have been marked in the map, have not been marked since there are no exact data available concerning them at present.

Furthermore, the interior of large towns is usually healthy (Istanbul, Eskisehir, Afyankarahisar, Konya). Ankara even in 1926 was so well restored to health that no attention need be paid to malaria within the city. In Izmir, the center of the town is healthy, but the suburbs in the north and south extend into regions very seriously infected with malaria. In the course of time, the indefatigable hygienic work of the Turks has improved much. Disturbances of normal life, however, may restore the old unfavorable conditions.

The most dangerous species of Anopheles are: A. elutus, superpictus, maculipennis. The first is the principal vector in the hot lowlands, chiefly also in the elevated plain, the last in the north and in the elevated plain up to the mountains. A. superpictus chiefly occurs in the mountains and hills.

It is fostered by dry summers with early termination of the spring-rains. On the other hand, such years dry up the breeding places of A. elutus in the plains early and extensively. Thus, they are unhealthy in mountains and hills, but healthy in the plains. Years with late and great rainfall in spring, however, effect the reverse. For this reason, the distribution of malaria intensity often fluctuates with the years in the single regions in different ways.

The present species correspond to the Macedonian species, like the Anatolian fauna on the whole. Only in the extreme south (Iskenderon(Alexandrette)), A. sergenti joins them. In the southern plains, the flying time of

the Anopheles begins more than one month earlier than on the elevated plain and lasts longer as well.

On the whole, only a very summary representation not considering the most recent facts could be given in the present state of affairs.

E. MARTINI

ARTHROPODA AS VECTORS OF DISEASES (EXCEPT ANOPHELES) IN THE NEAR EAST

Translation prepared by:
U. S. Fleet, U. S. Naval Forces, Germany,
Technical Section (Medical)

Yellow Fever Mosquito - Sandflies - Ticks

If the exploration of the distribution of diseases or of species of animals is still in its beginnings, the reported locations by no means give a picture of the actual distribution but often only of the presence of explorers who worked in the respective region. If, for instance, Phlebotomus squamipleuris has been found in India and on the Caspian Sea, nobody doubts that it will occur between these places as well and beyond these. The same applies to Ph. tiberiadis (Tiberias and Abyssinia). Only the future work of decades may give approximately truthful concepts of such distribution and of its laws.

On the map, the places are indicated by figures. If no positive data are available, the figures are absent. The occurrence of Aedes aegypti is in part only concluded from the report of dengue-epidemics, since according to the present opinion, this disease is transferred only by this mosquito in the Mediterranean region and in western Asia.

The Russian territories and Egypt, Palestine, and the Sudan are explored most. Only rare reports are available on Anatolia, Syria, Iraq, and Arabia.

I. Yellow Fever Mosquito: Aedes Aegypti

Aedes aegypti: yellow fever mosquito. Cosmopolitan. Transfers dengue in the Mediterranean region and western Asia. Occurs in the Mediterranean coastal districts, in Asia Minor in altitudes up to 600 M., Black Sea coast of the Caucasus and Asia Minor, Syria, Palestine, Egypt, Sudan, Red Sea, Arabia, Iranian coastal region. On the Iranian highlands its occurrence must not be expected on account of the too severe climate.

II. Sandflies: Phlebotominae

The medically most important species of Phlebotomi, Ph. papatasii sergenti, major, and chinensis occur throughout the Near East, as far as the ecological conditions are present. According to KAMALOV (1934)

all species of Phlebotomi are absent in western Georgia (except the Black Sea coast). Ph. perniciosus, which is important in the western Mediterranean region, evidently has its distribution boundary in the Near East and is of no great importance there. As regards the other species, it is hard to say to what degree the scarce data are to be explained by actually dispersed distribution, by the way of living, or by confusion with other species.

Synopsis of the reported locations in the Near East known until now
(In brackets: Smaller reported locations which are not indicated on the map)

1st group: Phlebotomus papatasii

Ph. papatasii Scopoli: the transfer of pappataci fever and (at least in some regions) Oriental boil has been proven. Distributed throughout the Mediterranean region up to the Oriental (India, Java) and in part of Ethiopia.

Synonym: duboscqui Nev. Lem.

Transcaucasia: Tiflis, Erivan, Nakhichevan, Baku, Dzhulfa, Poti, Batum, Gonio, Gori, Bortchalo, Karaiasi, Kakhetia, coast of the Black Sea as far as Trabzon; Iran: Resht, Tehran, Kaswin, Manjil, Hamadan, Kermanshah (Abu Gherm, Kerind, Aabanshah, Rutbah); Iraq: Mosul, Baghdad, Basra; Palestine: Jerusalem, Jericho, Haifa, Amman, Djerash, Maan, Mozah, Rosh Pinah, Tiberias; Syria: Alep, Hellaweh, Tripoli, Batrun, Enfeh, Beyrouth, Zachle, Adde, Beherreh, Bet Meri, Bar Elias, Kubba; Egypt: Cairo, Zagazig, Sudan (El Fasher, Singu, Abu Haraz, Ghoz Khadra, Tokar, Hombori); Turkey: Dardanelles, Izmir, Ankara, Jachshehan, Istanbul.

2nd group: Phlebotomus sergenti

Ph. sergenti Parrot: the transfer of Oriental boil is regarded as proven. Distributed from the western Mediterranean region to northern China.

One distinguishes the varieties mongolensis Sinton (synonym: borovskii Chodukin Sofjeff) and alexandri Sinton .

Transcaucasia: Erivan, Baku, Tiflis, Gori, (Mukhran, Muranie); Iran: Kazvin, Tehran; Iraq: Mosul, Baghdad, Amara; Syria: Bcherreh.

Ph. caucasicus Marzinovsky: Known only in Transcaucasia, Transcaspia, Iran, and Afghanistan so far.

Synonyms: li Popov, selectus Khodukin. The older data of reported locations must be used with great reserve, since the species was usually mistaken for sergenti formerly, from which it is difficult to differentiate.

Transcaucasia: Erivan, Baku, Tiflis, Gori, Karaiasi, Kakhetia, Nakhichevan; Iran: Tehran, Kazvin, Hamadan, Assadabad, Kermanshah, Mashhad, (Abu Germ, Kerind, Aabanshah, Rutbah).

3rd group: Phlebotomus major

All species of this group are suspected to be vectors of Kala-Azar, the participation in the transfer has been confirmed so far with more or less probability only with chinensis, major, and perniciosus.

Ph. major Annandale: distributed from the eastern Mediterranean countries (Italy, Greece) and the Crimea to the Oriental region. Regarded as a vector of Kala-Azar in the eastern Mediterranean region.

The animals in Syria and Palestine belong to the var. syriacus Adler and Theodor.

Transcaucasia: Tiflis, Erivan, Borjom, Gori, Bortchalo, Gomi, Gandzha (Kirovabad), Barda; in the north Caucasus region as far as Armavir; Palestine: Jerusalem, Haifa, Mozah, Rosh Pinah; Syria: Alep, Batrun, Enfeh, Zachle, Adde, Bcherreh, Bet Meri, Bar Elias (Kubbah), Cedar Grove; Turkey: Dardanelles.

Ph. perniciosus Newstead: regarded as an important vector of Kala-Azar in the western Mediterranean region. Distributed throughout the Mediterranean region. Eastern boundary of distribution area seems to be in Palestine and Iraq. Former reports from Transcaucasia and Transcaspia are said to be based on false determination of species. Since, however, the species is positively known to occur in Iran (Resht), it is possible that recent reports from Transcaucasia (POPOV 1935: Gandzha (Kirovabad) and Barda in Azerbaidzhan) are true after all.

Variety: var. tobbi Alexander, Theodor, and Lourie 1929.

Palestine: Rosh Pinah; Syria ? (without specified location of occurrence); Iran (Resht).

Ph. chinensis Newstead: On the strength of successful experiments of infection, suspected of Kala-Azar transfer particularly in northern China. Distributed from northern China to the eastern Mediterranean countries (Crete, Roumania, Dalmatia, Malta).

Apparently split up into a series of geographical races. According to Adler, Theodor, and Lourie 1929, the animals occurring in Iran, Transcaucasia, and Transcaspia belong to a special race ("longiductus Parrot"), the animals in Syria to a second, those in northern Palestine to a third.

Transcaucasia: Erivan, Tiflis, Kakhetia, Bortchalo, Gori, Gonio, Borjom; Iran: Tehran; Palestine: Rosh Pinah; Syria: Alep, Bcherreh.

4th group: Phlebotomus minutus

As far as known until now, without any medical importance. Despite that, human blood has been found also in Ph. minutus, and this species of Phlebotomus is the only one reported from Aden (pappataci fever!) so far. It is known of the African species Ph. schwetzi and some others of the minutus group that they attack man.

Ph. minutus Rondani and some 13 other species: The older data of reported locations must be treated with the utmost reserve, since other species of the same race have

been often reported as minutus. In Europe "minutus" is positively known only in Greece. It is probable that also part of the reported locations from the Near East actually refer to other species of this race.

III. Ticks: Ixodidae

1. Argas persicus Oken: Poultry tick. Western Asia, Cyprus, Egypt, Sudan, southern Russia. Is suspected of transferring Asiatic relapsing fever occasionally in addition to poultry spirochaetosis. Observed in poultry pens and surroundings.

2. Ornithodorus papillipes Birula (= tholozani Laboulbene and Megnin): Iran, Afghanistan, Caucasus, Transcaucasia, Arabia, Palestine, Syria. Most important vector of the Asiatic relapsing fever (Miana). Occurs in houses, caravanseries.

3. Ornithodorus lahorensis Neumann: is suspected like the preceding species of being a vector of the Asiatic relapsing fever. Occurrence equal to that of the preceding species, only it alone is reported from Asia Minor. Transfers tularemia in Asia Minor, same locations as the preceding species.

4. Ornithodorus moubata Murray: transfers African relapsing fever. Whole of Africa (referred to the map): Egypt, Nile valley, Sudan, Erithrea. House vermin.

5. Rhipicephalus sanguineus Latreille: Dog tick, transfers the exanthematic tick fever. The reported occurrence certainly does not correspond to the actual distribution. North Africa, southern Spain, southern Italy, Greece, Asia Minor, Iraq, Palestine, Arax valley, Georgia, Sudan, Erithrea, Arabia (Sana). Imported into rooms with central heating, even in Germany, parasite in hotels.

6. Amblyomma hebraeum Koch: Africa. In the Sudan it transfers African tick-typhus. Free land tick, on pastureland, in stables.

R. von BLUMENTHAL and W. HENNIG

AMEBIC DYSENTERY THROUGHOUT THE NEAR EAST.

Translation prepared by:
U. S. Fleet, U. S. Naval Forces, Germany,
Technical Section (Medical).

Amebic dysentery (entameba histolytica) is found throughout all territories of the Near East. However, frequently no clear distinction is made from bacillary dysentery, so that one must think of bacillary and amebic dysentery when the dysentery incidence is discussed. The above mentioned fact also explains the frequently contradictory statements concerning the frequency of amebic dysentery. For the search for dysentery ameba the fresh stools of the patients, which possibly should still be at body temperature, must be examined for motile vegetative forms of the entameba histolytica, or a preparation according to Heidenhain must be made. The diagnosis of an amebic dysentery should be considered as established only if there is no doubt of the presence of tissue invading forms containing erythrocytes. In Turkey amebic dysentery was observed along the frontier between Turkey and Persia and throughout the Gallipoli peninsula (Dardanelles) as well as throughout its Mediterranean Coast territories. No further data are available.

In Iraq amebic dysentery is widely spread. Baghdad, Amara, Kur, and Basra are the territories with the highest incidence. Particularly the territory between the Euphrates and the Tigris rivers and first of all Upper Mesopotamia (July-October) must be considered as contaminated with amebic dysentery.

In Iran some cases were observed in Teheran, but one should consider the entire area and particularly southern Persia as exposed to the danger of infection with amebic dysentery.

Southern Russia and Transcaucasia are areas of endemic dysentery. It is particularly the region of Baku (Balachany), Tiflis, Erivan, and Gandzha (Kirovabad) which are repeatedly mentioned as contaminated with amebic dysentery. In the period between the months of June and September there is a considerable increase of the number of cases.

Syria passes for an area where amebic dysentery is endemic. It is particularly frequent throughout the Lebanon and Beyrouth. Several cases of amebic dysentery have also occurred in Damascus.

In Palestine amebic dysentery is considered as one of the "most frequent diseases". 35 % of all dysenteric diseases are due to infection with amebae, which attains its highest frequency during the summer months. The entameba histolytica was very frequently found in Jerusalem, Tiberias, Haifa, Damascus, and Nazareth. Ac-

cording to recent reports (1940) 30.5 % of the Arab population have the be regarded as contaminated with entameba histolytica; one third of the contaminated persons do not suffer from intestinal discomfort. The reaction for occult blood in the stools is negative in 5.26 % of the cases.

In Transjordania no accurate data on the occurrence of amebic dysentery are available, but it is almost sure that here too, a widespread incidence of amebic dysentery must be taken into account.

For Arabia only very general data for dysentery are known. As exposed areas the following territories were mentioned: The coasts of the Red Sea and the Persian Gulf, and the Yemen territory.

In Egypt amebic dysentery is found throughout the entire territory. The coast areas of the Mediterranean and the Red Sea, the Nile delta, and the Nile valley and the Suez Canal Zone (Alexandria, Cairo, Port Said) are regarded as contaminated to a particularly high degree. In addition the Sudan (Khartoum) and Nubia must be considered as areas exposed to amebic dysentery.

G. PIEKARSKI.

LEISHMANIASES IN THE NEAR EAST

(with 5 Charts)

Translation prepared by:
U. S. Fleet, U. S. Naval Forces, Germany,
Technical Section (Medical)

The Leishmaniases, namely Kala-Azar (Leishmania donovani) and the Oriental Sore (Leishmania tropica) apparently occur throughout the entire Near East. It obviously seems that a closer investigation is sufficient to reveal that they are frequent in number even in territories where they seem to occur as sporadical cases only. Even though it was denied that Kala-Azar occurs in certain countries, such as f.i. in Palestine, one recently found cases of Kala-Azar in that country in addition to the dermal Leishmaniasis. The Kala-Azar of the Mediterranean littoral usually occurs as a Leishmaniasis of the children (L. infantum), while it is very rare that adults are afflicted with it. In the Near East one frequently finds the Leishmaniasis of the dogs in addition to the human forms. Attention must be paid to it, as the dog must be considered as a virus reservoir and therefore as a source of infection.

The transmission of Leishmaniasis is attributed to the sand flies of the species phlebotomus (Ph. maior, papatasii, perniciosus, sergenti et al.), but the relations between the Leishmaniae and the phlebotomi cannot yet be regarded as clear. (Compare the distribution of the Phlebotomi, Map II/3, with that of the Leishmaniasis, Map II/5).

For Turkey only very few data are available. The dermal Leishmaniasis has been observed in Istanbul, Trabzon, Inebolu, Mytilene, Smyrna (Izmir), Nicosia (Cyprus), Heredere on the Gulf of Alexandrette (Iskenderon), Adana, in the district of Balikesir and Tchanakale and around the sources of the Euphrates and Tigris rivers. In 1940 the first case of Kala-Azar of an adult was observed in Inebolu.

In Iraq the Oriental sore occurs as the principal form of Leishmaniasis. It is frequent throughout the territory between the Euphrates and Tigris rivers (Mesopotamia), among other places in Aintas, Amara, Basra, Diasekir, Kirkuk, Kut, Mosul, Nasaria, Suleimani, Baghdad with the air-port Hunaidi south of the town (occurrence of Oriental sore principally during the months September to March). Kala-Azar was observed only very rarely. The first case was found in 1916 in Baghdad. Later on some more cases were discovered there as well as in Mesopotamia (Kut 1919).

Chart 1. Azerbaidzhan
O Canine Leishmaniasis
● Visceral Leishmaniasis
△ Dermal Leishmaniasis
(Reported by J.MRUGOWSKY)

In Iran too, Kala-Azar allegedly occurs, but no accurate data are available. Contrary to that WENYON (1922) stated that Kala-Azar is unknown in that country. Oriental sore is widespread, and it is found in Tehran, on the Persian Gulf (Bushire), Avaz, Shiraz, Isfahan, Qum, Pendeh, Yezd, and in the provinces along the Caspian Sea.

In southern Russia it also occurs frequently, and it is particularly the Caucasus area (Transcaucasia, Azerbaidzhan) with Baku, Erivan, [illegible] Gandzha, Lenkoran, [illegible] Tiflis, and the Kura area (district of Kasakh) which are contaminated (cf. Chart 1 and 2).

In eastern Georgia Kala-Azar and dermal Leishmaniasis occur. Their area of distribution is congruent with the occurrence of the phlebotomi.

Chart 2. Kala-Azar in the Kasakh distr.
Villages afflicted, after BOGOJAVLENSKI

1 Pirli	6 Gusein	11 Tatly
2 K.Chalfaly	7 D.Koiman	12 Geodzholy
3 Khilehyna	8 Kyrly	13 K.Tcheily
4 Tchily	9 Ag Koinak	14 Urk Mazly
5 Kosalar	10 Kasakh	15 Damirchilar

(Reported by J.MRUGOWSKY)

Chart 3. Palestine
● Oriental sore
□ Kala-Azar

In Syria the Leishmania donovani (L. infantum) and the Leishmania tropica also are frequent and they are distributed throughout the entire territory. Oriental sore principally is found in Aleppo, in the littoral plain of Lebanon, in Bar Eliaz, and in Aintab. Kala-Azar was also observed in Lebanon (Beyrouth) and in the Djebel district.

In Palestine and Transjordania according to recent investigations the two Leishmaniases were frequent. They occur principally in Jerusalem and in the vicinity of this town. But one finds them moreover irregularly distributed throughout the entire territory of Palestine (see Chart 3). Places where Leishmaniases is particularly frequent are Amman, Artuf, Haifa, Hebron, Jericho, Cantara, Mezza, Tel Aviv, and many small villages in the vicinity of the large places.

Only some general data are available for Arabia. One assumes that Kala-Azar occurs in the Aden protectorate, in Oman, and on several islands of the Persian Gulf. Hedjaz and Yemen also are considered as infected with Kala-Azar.

The Oriental sore occurs in addition to Kala-Azar in Egypt. The principal areas of endemics are situated in the Egyptian Sudan, in the river basin of the Blue Nile (cf. Chart 4), in Darfur (western Sudan), and in Kordofan;

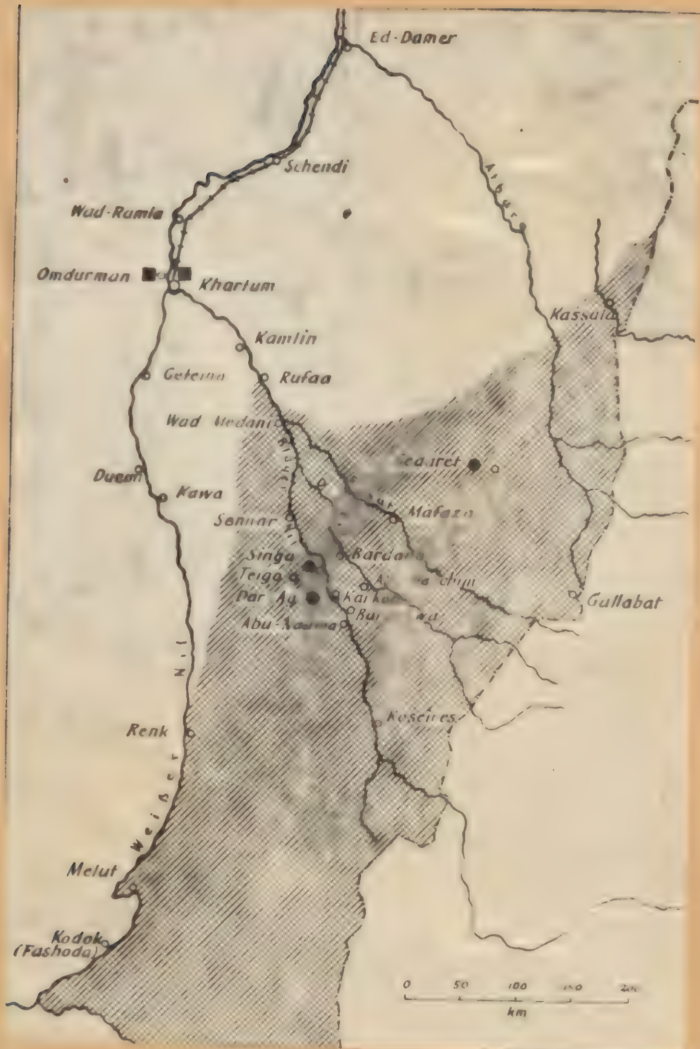


Chart 4. Eastern Sudan
• Oriental sore □ and hatching: Kala-Azar

those of the Oriental sore are situated in the Nile delta (cf. Chart 5). A sporadic incidence of Kala-Azar was observed in the southern Sudan (1939). Kala-Azar principally occurs during the months from August to February.

Chart 5. Nile delta
● and hatching: Oriental sore ◻ Kala-Azar

Recently dermal Leishmaniasis has been observed in the Sudan not far from the Abyssinian frontier and Kala-Azar (Leishmania infantum) near the Mediterranean coast, in Alexandria, and in Cairo. It is worth mentioning that 4 cases of oral Leishmaniasis were found in the Anglo-Egyptian Sudan (1935).

G. PIEKARSKI

LEPROSY IN IRAN.

Translation prepared by:
U. S. Fleet, U. S. Naval Forces, Germany,
Technical Section (Medical).

The cartographic presentation of leprosy still offers considerable difficulties, although the disease lends itself particularly well for geomedical research because of its positive symptomatology and the existence of definite foci in the invaded areas.

OBERDOERFER has outlined in his book "Fighting Leprosy" (Leipzig, 1941), the general principles for the cartographic registration of this epidemic. Countries which are free from leprosy and where occasional cases are caused by immigration and countries which are practically free from leprosy (less than 1 in 10,000) will have to be separate from countries with a moderate infection rate (not considerably more than 1 in 10,000) and countries where leprosy is common (about 1 in 100).

The list of countries where leprosy is moderately frequent includes Asia Minor and Egypt. OBERDOERFFER has initiated the cartographic registration on the occasion of his last journey in those countries. It was intended to create a map of the distribution of leprosy setting forth at the same time the factors facilitating the spread of the mycobacterium leprae such as the presence of the sapotoxin containing aroideen (colocassia and certain species of alocasia) and agrostemma githago, the seeds of which are sometimes contained in the breadstuffs if the cleansing methods are not satisfactory. OBERDOERFFER in his last investigations in Iran was able to prove the correlation between the distribution of these plants and leprosy and the absence of leprosy in areas where these plants did not grow. OBERDOERFFER has found out that the impurities of the bread due to agrostemma reach only up to the north-south parting line of the waters of the Elburs as far as Kuh-i-Baba in Hindukusch. South of this line there is no agrostemma githago. The distribution of colocasia begins again only at the Indian frontier and at the coast of the Persian Gulf. The distribution of leprosy is exactly the same. South of this watershed not a single case of leprosy has become known. We have thus found the great no mans land without leprosy and without sapotoxins that served as a barrier to the spread of leprosy from India to Europe until the time of Alexander the Great. These facts are based on personal observations and on the reports of European grain experts and medical experts who had stayed for many years in that area. (Extract from OBERDOERFFER's last journey report of 6 June 1941).

The result of these investigations was entered into the enclosed map of the distribution of leprosy in Iran. A draft of a map by OBERDOERFFER which was placed at our disposal by Professor Dr. BUTENANDT was used in the compilation of our map. The result of OBERDOERFFER's

investigations is in good accord with earlier reports which state that leprosy is completely unknown in the greater part of the country and the main area of distribution stretches from the northwest frontier near Täbris, passing by Sendschan and Kaswin, north of Teheran through Gilan (with Rescht and Pahlewi as invaded places) and Masenderan to the northeast of Chorassan including Mesched. Near Mesched there was in 1928 a village with 125 cases of leprosy. A leprosy colony with 32 Kurdish leprosy patients was to be transferred in 1939 from Senandaj, the capital of Kurdistan, to Hamadan where a new leprosarium had been completed. Outside this distribution area leprosy is found only in some places along the south coast, especially at Bushir among the pearl fishers. The total number of leprosy cases in all of Iran is estimated at 1000 to 2000, that is an incidence of 1 to 2 in 10,000.

OBERDOERFFER's opinion is confirmed by the latest publications of American missionaries in 1939 on 520 leprosy cases in Iran. According to this report 50.6 % of the cases were people of the Turkish race from Azerbaidzhan and the north of Chorassan. 33 % were Mongols who had immigrated from Afghanistan, 11.6 % were Kurds from the western frontier, 3.1 % were Gilanis and only 1.7 % had to be considered as genuine Iranians. The most intense incidence of leprosy with the Kurds in the west is also confirmed by these reports. Leprosy was, however, not found in a single case among members of the Iranic Lures and Bactiares who lived among them.

M. OBERDOERFFER † AND H.J. JUSATZ.

ANKYLOSTOMIASIS AND BILHARZIASIS IN THE NEAR EAST.

(With 1 map in the text)

Translation prepared by:
U. S. Fleet, U. S. Naval Forces, Germany,
Technical Section (Medical).

I. Ankylostomiasis.

Hookworm disease is caused by the hematoda Ancylostoma duodenale and Necator americanus by penetration through the skin of the larvae hatching out in the humid soil. The disease is able to spread at an average temperature of 20 to 35°C. if the soil has a certain humidity provided either by irrigation or by rainfall of at least 400 mm. The infection is contracted by walking with bare feet or bathing in fresh water containing feces of the indigenous population and sometimes by drinking infested water.

In Turkey only the highly infested province of Rise (Lasistan), a shore district of the Black sea southwest of the Caucasus, has been the subject of close investigation. The infections were caused by Nacatar Americanus which was found in most of the villages of that area in 20 to 67 % of the population. The number of hookworms in the infected individuals amounts on an average to 45.

Arabia, Afghanistan and Belutchistan are apparently not invaded by Ankylostomiasis, which fact must be explained by the small amount of rainfall in these countries. In Iraq, by contrast, several foci have been discovered which are, however, less severe due to the rites (washing after defecation and urination), in this country.

A more intense distribution was reported in Iran in the last years, although the climatic conditions are not in favor of a spread (little rainfall, cold winters). Peculiar habits in the life of the indigenous population are probably responsible for this fact (HEINE 1938).

The hookworm disease occurred in several areas of Transcaucasia. Especially in the west of Georgia, in Abchasia, a strip of shoreland of the Black Sea with a humid and hot climate, several foci were observed. About 59 to 80 % of the population is infected with hookworms. An examination in a school at Suchum revealed that 72 % of the pupils were infected. According to PODIAPOLSKA (1936) the following numbers of hookworms could be ascertained in 708 Georgians:

in 426 - 60.2 %	1 to	10 hookworms
in 176 - 24.8 %	11 to	50 hookworms
in 54 - 7.6 %	51 to	100 hookworms
in 52 - 7.4 %	101 to	500 hookworms.

The disease has also been observed in the eastern part of Transcaucasia. The areas of Zakatal and Lenkoran in Azerbaidzhan are said

to be particularly invaded. The average incidence is stated to be 6 to 7 %.

Foci of the disease have recently been observed in Syria and in the area of the Lebanon. The parasites were probably brought into these areas by workers on the banana plantations.

In Palestine the disease is rather frequent in the Arabian orange plantations in the shore district of Jaffa. The incidence amounts, in some of the villages, up to 50 to 80 %. In the cities by contrast, such as for instance in Jerusalem, there was only 1 % out of 1344 inhabitants suffering from the infection.

In Egypt, Ankylostomiasis is strongly distributed in the delta of the Nile as well as in some other, artificially irrigated, areas. In the delta of the Nile more than 25 % of the population are hookworm carriers. Certain villages have incidences up to 72 %. We have to deal here in most cases with ancylostoma duodenale. The number of worms is low in most of the cases but severe clinical cases have also been reported.

II. Bilharziasis.

We have to deal with two types of Bilharziasis, namely B. haematobia (Bilharziasis of the bladder) and B. mansoni (B. of the intestins). A distribution of the disease is only possible in areas where freshwater snails permit a subsequent stage of development of the parasites. The most important intermediary hosts are: Bullinus (Isodora) truncatus for Bilharziasis haematobia and Planorbis (Planorbula) boissyi for B. mansoni. Bullinus truncatus includes the species of B. contortus, dybowskii and innesi.

The infection is caused by the free-swimming cercariae and may, therefore, be contracted from certain bathing places or by drinking infested water.

Bilharzia haematobium is endemic throughout various parts of Iraq. According to older reports about 20 % of the population of Mesopotamia are said to be infected. Many cases were reported more recently from Bagdad, Basra and the villages on the Tigris. 47 % out of 711 school children were infected at Basra 1921/22. Similar reports were received from the lower valley of the Euphrates and the adjacent areas

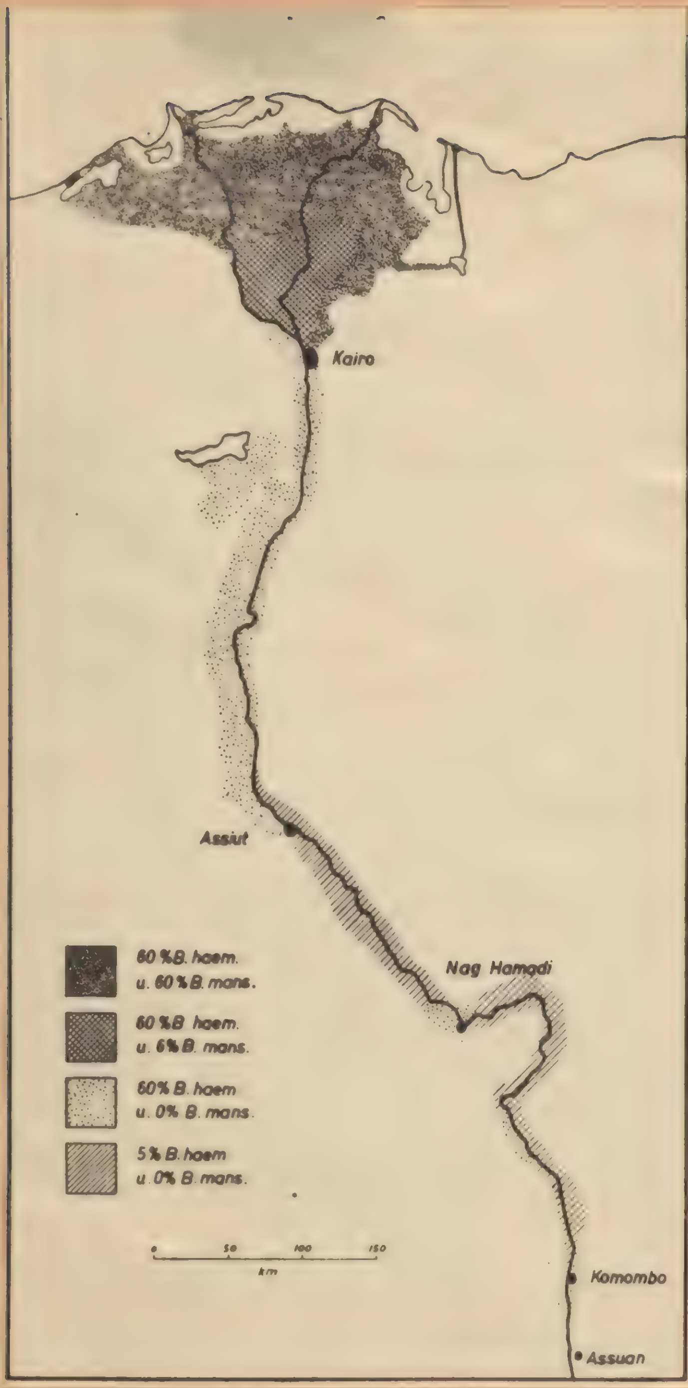
of Iran, especially from Khorramschar.

Certain localities especially the water places with carrier snails along the shore of Palestine are notorious for the prevalence of Bilharzioses. 4.3 % out of 1256 school children of the district of Jaffa excreted eggs and 6.7 more percent were suspected in 1925. In the first 6 months of 1937 the Municipal Hospital of the City of Tel Aviv had to treat 142 new cases of Bilharziasis.

In Arabia, Mecca is notorious for its prevalence and from there the Bilharziasis haematoma spreads over all the countries of Islam. Besides in this particular locality, the dry deserts offer little or no possibilities for the development of the snails. Nevertheless in 1925 two possibly endemic cases were reported of Aden. It was also reported that about 9.5 % of the inhabitants of the shore district of Yemen are infected with B. haematobia. Cases of B. duodenale have also occurred in this area.

Bilharziasis is of special importance in Egypt where the artificial irrigation offers the ideal living conditions for snails. According to recent and careful examinations 6 millions out of 16.5 millions of the Egyptian population are infected with B. haematobia and 3 more millions with B. mansoni. About 1.5 millions of these are infected with both types, so that about 7 million people are infected with either type of B. In the northern and eastern part of the delta of the Nile (District I) about 60 % of the population are infected with B. haematobia and about just as many with B. mansoni. In the southern central part of the delta (District II) B. haematobia occurs in about 60 % of the inhabitants, B. mansoni, however, only in 6 %. In the lower valley of the Nile between Cairo and Assiut (District III) B. haematobia occurs also in about 60 % of the population. B. mansoni, however, is less distributed because of the absence of the intermediate host. In the upper valley of the Nile between Assiut and Komombo (District IV) the incidence of the disease is much lower. Only about 5 % of the population are infected with B. haematobia. As is set forth in the following table, the severity of the infection is indicated by the number of eggs excreted and the percentage of fatalities.

Bilharziosis was also observed in the Oasis of Dachel in the Lybian desert westward of the Nile. At Rashada, one of the settlements of the Oasis, about 68 % of the inhabitants were reported to be infested with B. haematobia.



Bilharziosis in Egypt.
(According to J. A. SCOTT, 1937).

Bilharziasis in Egypt.

District	rural population	Infections % Haemat.	Mansoni	Ratio of fatalit. due to B: other diseases (1)	Excretion of eggs (2) Haemat.	Mans.
I	4,200,000	60	60	1:22	24	400
II	2,000,000	60	6	1:40	23	300
III	3,400,000	60	0	1:40	27	
IV	2,100,000	5	0	1:1000	11	

(1) between the ages of 5-65
(2) in 50 cc of urine or 1 cc of feces (according to J.A. SCOTT,1937)

The carrier snail Bullinus truncatus is distributed in all parts of the Nile, it can easily be collected on the water weed (Potamogeton crispus) in the little bays of the river. Bullinus is especially frequent in the numerous canals, irrigation systems and pools. During the periodical draining many of the snails dig in the ground or draw back on little pools and so survive the dry period. Localities where Bullinus truncatus was found and which were mentioned in the literature are: The pools of the Zoological Gardens of Giza, Marg, Ismalia, Alexandria and environs, Roda Island, Kom Oba, Oasis of Dachel, etc. - Planorbis boissyi the transmitter of B. mansoni is missing in Upper Egypt (south of Cairo). Nor is it found in the larger canals but it is distributed in the irrigation canals of the delta. Planorbis boissyi is even more resistant against drought than Bullinus truncatus. It is found above all in the following localities: Marg, Belbeis, Ismalia, Alexandria, Samanoud, Cairo (but not in the Nile river).

Bilharziasis has been endemic for quite a long time in the northern Anglo-Egyptian Sudan. In the middle Sudan the disease occurs here and there but a prevalence could not be noticed at any time. The infections are, however, widely spread in the southwest of the country, especially in the villages of the Darfur province. In certain areas of this district about 90 % of the school children were reported to be infected.

C. SCHLIEPER.

DENSITY OF POPULATION IN THE NEAR AND MIDDLE EAST.

Translation prepared by:
U. S. Fleet, U. S. Naval Forces, Germany,
Technical Section (Medical).

Statements concerning the density of population refer mainly to the country population as regards their actual space of living, because, in addition to cultivated areas, the respective administration districts also include steppe- and desert areas. The part of the population living in towns with more than 3000 inhabitants was not considered in the calculation of the average density, in the map only cities with 10,000 and more inhabitants are marked by special signs.

TURKEY: After the incorporation of the Sandshak Alexandretta (Hatay), the area of Turkey encompassed 768,736 square kilometers without lakes (8,434 square kilometers) and swamps (11,70 square kilometers). At the census held on the 20th October 1940 the total number of the population amounted to 17,869,901 people. The portion of the country population was 76,5 % (1935). We find a density of country population of 50 - 100 inhabitants per square kilometer in the fertile gardening districts of the southern coast of the Black Sea, in the north Anatolian mountain forests as well as in the east Pontic highland and in the agricultural well developed plains of western Anatolia. The steppe areas of interior Anatolia have a density of scarcely 10, most sparsely colonized is eastern Anatolia. The reason for this is the extermination of about 2,000,000 Armenians and Kurds after the First World War.

TRANSCAUCASIA: The area of Transcaucasia, since 1920 again under Russian control, encompasses within the three Soviet Republics only part of the ethnographic nations which extend into the Turkish, respecitvely Iranian state.

Soviet Republic:	Area sq.Km.	Inhabitants 1939	City - %	Country	Inhabitants per sq.Km.
Georgia	69,600	3,542,289	28.5	71.5	50.9
Azerbaidzhan	80,000	3,209,727	37.7	62.5	37.12
Armenia	30,000	1,281,599	30.7	69.3	42.72

IRAN: Iran, with an extent of 1,645,000 sq. Km. has 15,055,115 inhabitants according to the census of 1933. The distribution of the

population is disproportionate. 9,140,000 inhabitants live in the northern and north-western part of the country, including the area of Kermanshah and Hamaden. This amounts to 65 % of the total population with an average density of the country population of 10-15 inhabitants per sq.Km., while the extensive areas of the south and east are sparsely populated and the sålt deserts are deserted. The province of Kerman has hardly more than 2 inhabitants per sq.Km.

In Iran, a marked migration to the cities can be observed, which is expressed particularly in the marked increase of the population of Teheran, Tabriz, Isfahan and Meshed.

AFGHANISTAN: The estimated population of Afghanistan, with an area of 731,000 sq. Km., varies between 6 and 12 million inhabitants. About 500,000 people live in 11 cities with more than 20,000 inhabitants each. While the desert areas of the south are deserted, the irrigated valleys of the mountains have a density of country population of 10 - 20 inhabitants per sq.Km.

BALUCHISTAN: is for its larger part infertile mountainous country. In 1931 868,671 inhabitants were counted in its area of 348,698 sq.Km. There are only a few areas which have more than 1 inhabitant per sq.Km.

The most densely populated part of Baluchistan is the area of British Baluchistan Quetta-Piohn with 24,000 sq.Km. and Siarat. The area of Chagi, through which a strategically important railroad leads to the border of Iran, is almost deserted.

IRAQ: According to their own reports, Iraq encompasses an area of 453,500 sq.Km. (Almanac de Gotha 1942: 291,980 sq.Km.) with about 4,000,000 inhabitants (the official estimate made by the Iraq government amounting to 6,000,000 is probably too high). The portion of the city population amounts to 25 %. The bulk of the domiciled population conglomerates in the irrigated cultivation areas of the Euphrates and Tigris as well as the large affluents of the Tigris in Lower Mesopotamia. The highlands in the northeast, especially the mountain edges, bordering on irrigated plains and the oil-area around Mosul are relatively densely populated by Kurds. Domiciled Jazids live in the Jebel-Sinjar. Nomadic Arabs inhabit the intermediate river-basin of Upper Mesopotamia.

SYRIA: In 1939 Syria had 3,778,500 inhabitants and a total area of 203,000 sq.Km. The most densely populated area is the Republic Lebanon with 9,200 sq.Km. and 855,000 inhabitants, 25 % of which live in cities. This results in an average density of population of the country population of nearly 70 inhabitants per sq.Km. The autonomous coastal areas of Latakia, adjoining in the north, have a density of country population of 48 inhabitants per sq.Km. with 360,000 inhabitants and an extent of 6,500 sq.Km. The interior Syrian area, adjoining in the east, registers a low colonization in certain areas, which becomes more dense only in the surroundings of Damascus, Alep and Hama. The autonomous area of Druse has a density of country population of about 6 - 7 inhabitants per sq.Km. In contrast to the fragmentary permanent colonization of the northeastern steppe, which is cultivated mainly by Armenian, Kurdish and Assyrian refugees, only about 150,000 nomads live in the southeastern deserts.

Palestine with an extent of 26,305 sq.Km. has about 1,6 million inhabitants (1941). While the southern part, which changes into the desert, has only a density of 4 inhabitants per sq.Km., and the Jordan ditch is deserted, the surroundings of the large cities and the areas of the western mountain edges, bordering on plains, has, on the other hand, a density of population of about 50 - 140 inhabitants per sq. Km. While the increase of the Arabs is attributable to a strong natural fertility, the increase of the Jews on the other hand is a consequence of immigration. Today already about 4/5 of the Jews live in cities. The most impressive example of an unhealthy absorption by the cities is the city of Tel Aviv, which was developed by international Jewish capital. This city had 45,000 inhabitants in 1931, and in 1940 the population there had increased to 180 000 people.

TRANSJORDAN: (including the quarreled about area of Maan and Aqaba) with an extent of 90,000 sq.Km. has about 332,000 inhabitants. 6000 of these live in cities and about 200,000 in the fertile area of the western tabular edge (Tafelrand) approximately 5,000 sq.Km. cultivated area). This results in a density of population less than 2 inhabitants per sq.Km. for the remaining parts.

ARABIA: Estimates for the entire area of the peninsula vary between 4.5 and 12.3 million inhabitants. According to official state-

ments, Saudi Arabia is supposed to have 5,750,000 inhabitants and an extent of 1,579,000 square kilometers. The density of population in the sultanate Nejd and the kingdom Hejaz could be between 1 - 3 inhabitants per sq.Km. The emirate Asir on the other hand shows a density of population of 10 - 20 inhabitants per sq.Km. Yemen claims to have an area of 62,000 sq.Km. with 750,000 inhabitants, v. WISSMANN estimates its total population to be 3,5 millions; he furthermore estimated that the population of Rathjen was even more than 5 millions. Here too, the average density of population is approximately 10 - 20 inhabitants per sq.Km.

EGYPT: Only 1/30 (35,170 sq.Km.) of the total area (994,300 sq.Km.) of Egypt are cultivable soils; the valley of the Nile, the Fayum-basin and the delta of the Nile belong to the most densely populated areas of the world. In the cultivated areas there is an average density of population of 364 inhabitants per sq.Km., even if cities of more than 10,000 inhabitants are eliminated. The peninsula of Sinai, which is connected with Egypt does, aside from the capital El Arish (10,000 inhabitants) not have any colonies worth mentioning. The Bedouins are distributed over 61,000 sq. Km., of which only 88 sq. Km. are cultivated areas. This results in an average density of population of only 0,3 inhabitants per square kilometer. The village Cantara East (500 inhabitants) located at the Suez Canal and at the farthest point of the Palestine railway, sheltered, on 20,8 sq.Km., the largest military town the world has ever seen during the First World War.

H. HARMSEN.

OCCURRENCE OF MALARIA AND DISTRIBUTION OF ANOPHELES IN THE TRANSCASPIAN REGION.

(With 1 text-map).

Translation prepared by:
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I. Landscape and Climate.

Turkestan is a lowland desert surrounded by mountains and must be regarded as part of Central Asia because of the appearance of its landscape, which is caused by the extremely arid climate.

Immense sand-deserts, half-deserts, arid steppes, gallery-forests, forest and high mountains with the largest glaciers in the world determine the varied landscape-picture (see map III/3), whose great climatic, regional and biological contrasts hardly permit a general consideration. Both the climatic and the oecologic and other conditions predestine this region particularly as a first-rate reservoir of epidemics and not only as regards malaria.

Text map 1 shows a synopsis of the climatic conditions according to A. SCHULTZ and distinctly demonstrates the enormous contrasts of this region. We know that the development of malaria plasmodia progresses only with temperatures higher than 16°C. and progresses to completion practically only with 17°C. and more, and that the more certainly and quickly, the higher the temperatures are. The optimal values for tertiana lie between 23° and 26°C., for tropica between 28° and 30°C. We assume 10 days approximately as the shortest period of development for both forms. During the observation of the isotherms, not the annual, but the summer-isotherm, above all the average temperature of the hottest summer-month is decisive: For this reason, continental places, as particularly exist in our region, have more possibilities of development for malaria than places with sea-climate with equal annual average temperature.

The climate is markedly continental with great daily and seasonal fluctuations. In summer, there are central Asiatic cyclones, in winter north Asiatic anticyclones. According to A. SCHULTZ, the following climate-districts can be distinguished:

I. Desert-climate with rainfall below 200 mm. almost completely rainless summer, average temperature of the hottest month higher than 27°, of the coldest month around 0°. Chiefly spring-rain.

II. The temperate desert-and steppe- climate in northern Turkestan with rainfall up to 250 mm. , which is fairly uniformly distributed over the whole year, with the hottest month of 25°C and the coldest of below 0°C.

III. The steppe and promontory climate with rainfall from 250 to 500 mm., which falls chiefly in winter; the hottest month having more than 25° and the coldest being below 0°.

IV. The steppe and promontory climate of northeastern Turkestan with rainfall from 250 to 500 mm., which is uniformly distributed over the whole year, with the hottest month of more than 22° and the coldest of below 0°C.

V. The mountain climate with more than 500 mm. rainfall, which is uniform over the whole year, the hottest month having more than 22° and at least 4 months with a temperature of more than 10° (locally developed especially in Tienschan).

VI. The highland desert climate.

We find the slightest rainfall in the Amur-delta (only 80 mm.) The duration of the snow fluctuates intensely. In the mountains, it lasts more than 4 months.

...... lines of equal temperature
------ lines of equal precipitation in cm

Climate-map of Turkestan.
(According to Arwed SCHULTZ, Manual of Geographic Science, Publishers Athenaion, Potsdam).

II. Occurrence of Malaria in the Transcaspian Region.

Before World War I, about $3\frac{1}{2}$ million malaria cases were annually counted in Russia, i. e. 215 - 230 per 10 000 inhabitants. Of course, this rate changed in intensely infected areas. Thus, there were 800 cases in the Caucasian region, 400 in the Volga region, and 250 in Turkestan per 10 000 inhabitants. These sick-rates are not only subject to the usual seasonal fluctuations (seasonal malaria), but within certain periods the cases of malaria increase in such a way that one may speak of epidemics. In Russia, such epidemics occurred in the following years:

1894, 1899, 1903, 1908 and probably the greatest in 1923, which gradually subsided in the subsequent years. RASHINA reports the following figures for 1923 - 1926:

Year	reported malaria cases	per 10,000 inhabitants
1923	6,239,000	474,0
1924	5,983,477	449,7
1925	5,428,429	388,8
1926	4,523,696	310,1

But these figures comprise only part of the actual malaria cases, since a great proportion of the population shunned voluntary treatment and thus could not be listed and since only a slight proportion of the population were properly examined owing to the vast distances and other obstacles given by the nature of the country. Thus, DOBREITZER estimates the actual figure of malaria cases in 1923 at more than $12\frac{1}{2}$ millions, that is more than double the reported cases. The causes which led to the last almost catastrophic epidemic, are manifold. One of them was the starvation and the constitution of the inhabitants weakened by epidemics (spotted fever, relapsing fever, cholera). Then, there was the decline of agriculture and the associated marked decrease of the numbers of domestic animals. Many bew breeding places of anopheles arose owing to the deficient cultivation of the soil, and the climatic conditions for further development of the plasmodia were present as well, thus malaria could seize the population weakened by hunger and privation as swift as lightning to an extent previously unknown.

After the war, numerous malaria stations were established, particularly in the endemic areas. Through the Kirghiz steppe, a ring of stations for observation of the plague was laid, and these stations were simultaneously charged with research and treatment of malaria.

The most serious malaria foci there do not always lie directly on the rivers but also in the steppe, such as in the district of Saratov - in the region of Novousensk and Dergatskhi. One may even speak of a steppe-malaria, for these regions have a very arid, desert-like climate, and all the same, almost every inhabitant had on an average two kinds of malaria (tertiana and tropica) per annum.

In Turkestan, malaria is limited to the river-oasis settlements, furthermore to the canalization-systems, rice-fields, reservoir-ponds, then to the natural accumulations of water and to the swamp-territories caused by deficient canalization. There are everywhere possibilities of breeding for the anopheles, which are even present along the mountain-rivers high up the mountains.

The the Atrek region, malaria is of great importance and holds the first rank among the infectious diseases. In West Bukhara, tropica is predominant; also Samarkand is infected with tropica. In 1932, an almost 100 % infection of the population with malaria was observed. In Pamir and farther in the Altaic district, there exist serious endemic tropica-foci. The sick-rate there rose in 1925 to 711 per 10 000 inhabitants. The hunger-steppe, too, which has been extensively irrigated in connection with the cotton five year plan, shows an increasing tendency of tropica.

In other places of the country, the rate of malaria cases has increased again and again since 1924, so that Russian authorities have even pointed out the possibilities of a new imminent epidemic. Since in the Afghanian and Iranian territories adjoining in the south, in which there is no malaria control whatsoever, extensive tropical foci are known, and since through the constant military movements in Iran, there exists an increased hazard of infection and many possibilities of importing the disease, the occurrence of extensive epidemics must be always reckoned with, if the respective climatic conditions are present.

At present, large parts of Turkestan must be regarded as endemic malaria-areas, with the children forming the principal reservoir for this epidemic. By a change of immunity conditions (caused by diseases, starvation, etc.), new cases also of adults and thus new epidemics, may occur any time. In addition to tropica, tertiana and quartana occur in the whole region. The endangering of the single regions by malaria is marked on the map by more or less dense hatching of the respective regions. Only regions to the west of the

74th degree of east longitude have been considered.

III. Distribution of Anopheles.

A. maculipennis (1) is distributed over the whole of Turkestan. It is a principal vector of malaria. The larvae prefer sunny waters covered with low dense grass or horizontal vegetation (sea-weed, moviophylum, etc.), but they stand even slightly salty water (atroparvus). Important breeding-places are furthermore the areas of inundation of the rivers, canalization-systems, steppe-ponds, and swamp districts. The hibernation is supposed to be finished even in the middle of February (about the middle of March at the latest). The first eggs occur in the beginning of April, the first gnats in the beginning of May. One occasionally finds the larvae also in tubs. The principal flying time of the gnats is from the end of July to the beginning of August. The occurrence of numerous new malaria cases is probably associated with it. Thus, for instance, the garrison of Samarkand had the peak of the malaria curve in August (spleen index 20,4 % in 1933). The gnats hibernate in stables cellars, and barns. As regards the distribution of the single races, it is obscure so far. Messeae seems to be predominant, atroparvus around the Caspian Sea. The number of generations fluctuates between 2 (in the Altai-mountains) and 9 (in the sand-desert). Maculipennis occurs in altitudes up to 1200 m.

A. superpictus (2) is doubtless the principal vector. The larvae are found from May to November in shallow brooks or river-beds (brook-breeders), but also in all other waters, in overflooded meadows and rice-fields. On the whole, sunny places are preferred. Deep river-beds may only temporarily lie in the shadow, otherwise the larvae cannot develop. Superpictus occurs in altitudes up to 2000 m. and likes to breed with bifurcatus. Its importance as a vector of malaria is positively proven. The gnats are very greedy for blood and bite frequently, especially during dusk and night. They like to fly into houses and stables and bite both man and animals. Principal flying time of the gnats: August - September.

A. bifurcatus (3) occurs, not very frequently, throughout the whole region, in the mountains up to 1500 m.,where it usually breeds with superpictus. The larvae often live throughout the whole year at the foot of the mountains. It may be neglected as a vector.

A. plumbeus (4), a typical tree-cavity breeder, may hardly be considered as a vector due to its rarity in the Transcaspian-Turkestanian region.

A. hyrcanus (5): The original species is one of the most widely distributed species of the globe and shows a marked variability. In the Transcaspian area, one finds most frequently the var. pseudopictus (light fourth hind leg section) besides the typical form as well. The larvae appear particularly in the inundated areas of the rivers (reed) from April to the beginning of November. In the Transcaspian region, its part as a vector is not positively settled, though the importance of this species increases toward the east. An. hyrc. sinensis plays an important role in Eastern Asia, as well as hyrc. nigerrimus in Southern Asia and in the Malayan region. The principal flying time of the gnats falls in the months of June-August.

A. elutus (6) extends from the south into the region and prefers approximately the same breeding-places as maculipennis, but also stands a more intense sunshine on the water and a greater salt content. It has its main importance in the east, but also in southern Turkestan, it is an important vector of malaria.

A. algeriensis (7) was found only once in 1930 and has no importance at all in Turkestan.

A. pulcherrimus (8) must be regarded as a principal vector particularly in many districts of the desert territories. Toward the north, it extends to the hunger-steppe. The larvae prefer ponds covered with vegetation, marshy places, stagnant water, rice-fields, and even salty water. The gnats are chiefly active at dusk and also fly into houses, in search of the light. As steppe-insects, they dispose of a good flying capacity and are capable of a great resistance against dryness. They hibernate as larvae.

The regional distribution of the various species of anopheles shows, as a summary, the following picture:

The mountains and promontories of Southwest Turkestan are particularly rich in anopheles, and the gnats appear in vast numbers from August to September. During the last few years, malaria there decreased considerably owing to sanitation-work. Toward the north, the variety of species decreases considerably and only maculipennis (1) remains finally.

The Syr-Darja-region can be subdivided into three areas according to BALKASHINA: 1. foot of the mountains, 2. southern subtropical area of Mediterranean type, 3. northern district (character of Central Asia). The anopheles in this area show a special type of distribution. Bifurcatus (3) occurs frequently at the foot of the mountains, more rarely in the desert districts. Hyrcanus (5) is more rare at the foot of the mountains, but more frequent in the northern and southern part. The larvae appear there from the middle of May to October. Pulcherrimus (8) is absent in the north. Superpictus (2) is frequent in the south and at the foot of the mountains. Maculipennis (1) is predominant in the northern district, but is frequent elsewhere as well.

Some additional species probably reach from Afghanistan into the Transcaspian region. We also know that the border-districts are seriously infected with malaria. On the whole, Turkestan still holds many problems awaiting a solution.

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SANDFLIES AND TICKS AS VECTORS OF DISEASES IN THE TRANSCASPIAN REGION

(WITH 3 ILLUSTRATIONS)

Translation prepared by:
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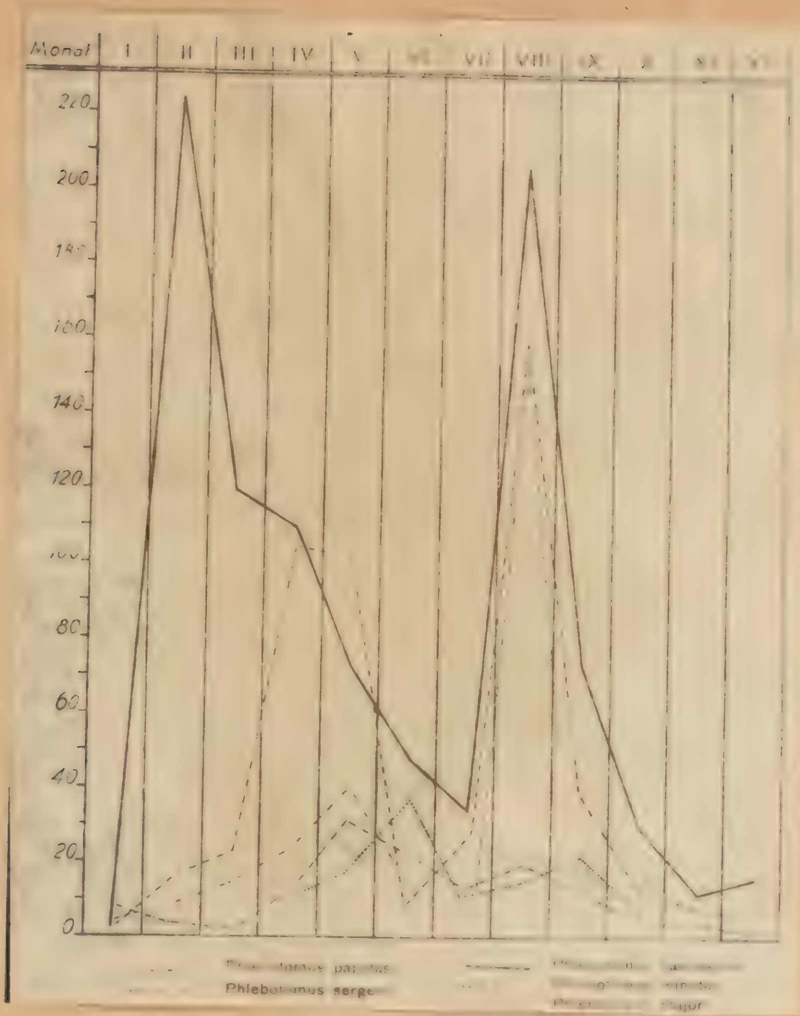
I. Sandflies: Phlebotominae

The phlebotominae of Russian Central Asia belong to the same species as those occurring in the Mediterrarean region or in the Near East or are closely related with them. Only one form (Ph. kandelakii, which I should like to add to the European perniciosus-group) has the eastern boundary of its distribution area there, the others extend further to the east (chinensis, sergenti group) or to the south-east (papatasii, major). Though nothing positive is known about the medical importance of the phlebotominae in Russian Central Asia itself, the experience obtained in the Mediterranean region, in the Near East, in China, and in India can thus be transferred to this region (even if only with reserve). For the same reason, it can be assumed that the species reported from Russian Central Asia are distributed through the whole region and occur even where they have not yet been found so far. The map shows that (with one exception) the northern boundary of the distribution area of the phlebotominae lies along the Transcaspian railroad. Of course this can be explained by the fact that the collecting expeditions on whose results alone our present knowledge of the distribution of the phlebotominae in the Transcaspian area is based, moved chiefly along this line until now. There is no reason to assume that the phlebotominae might not occur further north of this line as well, particularly if they can also live far from human settlements in the burrows of mammals (especially rodents) and of birds, as recent examinations have shown more and more distinctly.

Some facts are known about the way of living of the phlebotominae in Turkmenistan: Most species have been found in large numbers in the burrows of the various mammals. In porcupine nests in which the temperature does not drop below 15° C., they develop throughout the winter. The graphical representation below (Illustration 1) shows the principal flying times of some species in such rodent burrows. Where man lives, Ph. papatasii, sergenti, caucasicus, and minutus join him closely. The same species (in addition chinensis) have been found particularly in the "Suijms" in the district of Kaary Kala.



Ph. papatasii
Ph. sergenti
Ph. caucasicus
Ph. minutus
Ph. major

Illustration 1. Principal flying times of the sandflies in Turkmenia

These "Suijms" are caves in the mountains dug out by the Turkmenians in order to store grass (clover) for winter use. As regards the vertical distribution of the species, data are available as well. According to

them, almost all species occur up to altitudes of 1,000 M. Only Ph. sergenti (perhaps the form mongolensis) and two species of the major-group occur up to 2,300 M. in the Pamir mountains. Ph. wenyoni has been previously found only in altitudes higher than 700 M. The vertical distribution varies in the single districts of Turkestan.

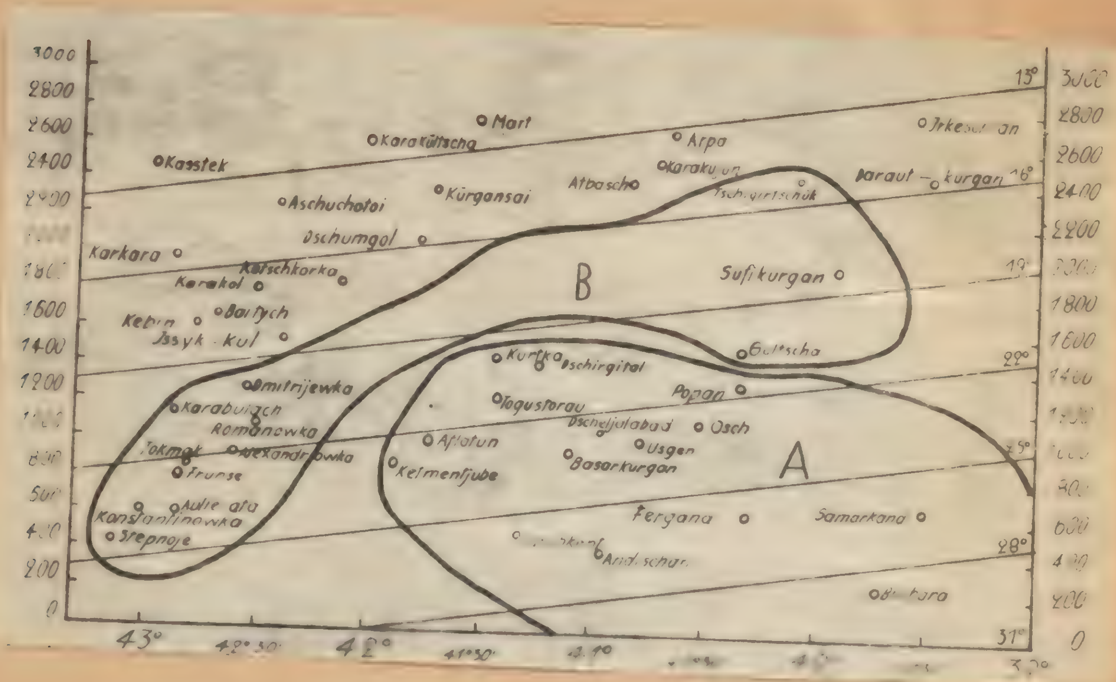
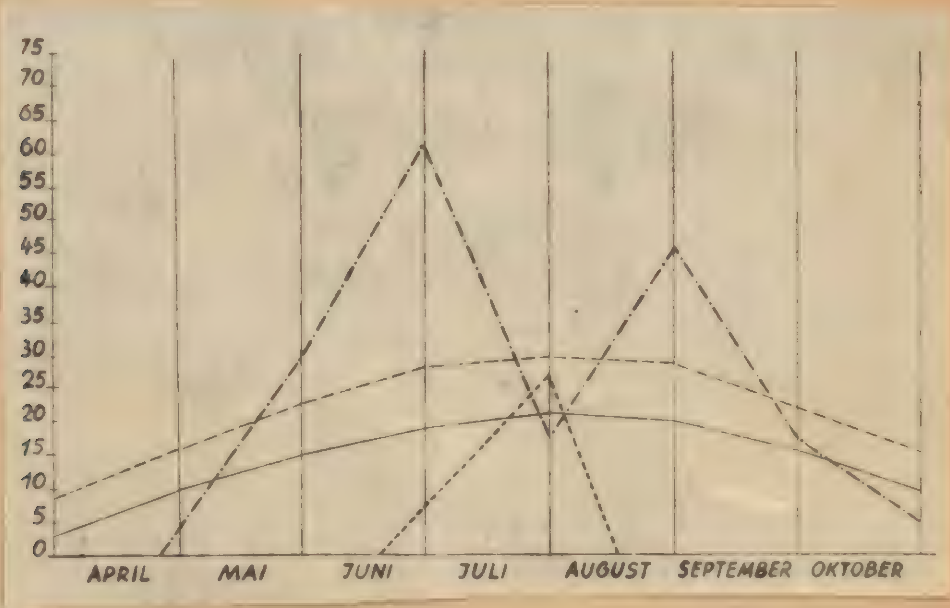


Illustration 2. Distribution of Phlebotomus in Kirghizistan (according to data of PETRISHCHEVA)

The indicated places have been entered according to their geographical latitude (abscissa) and according to their altitude (ordinata). The oblique lines indicate the average summer temperature. In the area marked A, all species observed in Kirghizistan have been found, in the area marked B only the species Ph. chinensis and Ph. caucasicus (sergenti-group).

Illustration 2 shows, for instance, that in southern Kirghizistan, only Ph. caucasicus and Ph. chinensis pass a certain altitude (around 1,800 M.) and that, at the same time, only these species occur in northern Kirghizistan and then in lower altitudes only. This makes it clear that one approaches the northern boundary of the total distribution area of Phlebotomus where only these two species (or one of the two, for instance Ph. chinensis) are found (such as in northern Kirghizistan).

As in the greater part of the distribution area, the phlebotominae generally have two principal flying times in the Transcaspian Region as well, though these coincide in districts with unfavorable climates. This is known only of Frunze so far. Illustration 3 shows in what way this depends on the average monthly temperature of the summer months.



Mean monthly temperature in Ashkhabad
Mean monthly temperature in Frunze
Flying time of Phlebotomus in Ashkhabad
Flying time of Phlebotomus in Frunze

Illustration 3. Dependence of the flying times of Phlebotomus on the mean monthly temperature (according to PETRISHCHEVA)

Synopsis of the Reported Locations known until now in the Transcaspian Region

1st group: Phlebotomus papatasii

Phlebotomus papatasii Scopoli: is in addition to Ph. perniciosus, Ph. sergenti, and perhaps Ph. major, the principal vector of pappataci fever in the Mediterranean region. In the same area, it is regarded as the most important vector of Oriental boil (alone or in association with Ph. sergenti). Distributed from the western Mediterranean region to northern British India.

Turkmenistan: Numerous individual reported locations in the area of Kherki and Khelif, in the area of Chardjui, Deinau, and Farab, in the basin of the Tedjen and Murgab rivers (among others: Merv, Takhta, Serakhs, and Kushka), and in the area of the Kopetdag river from Kizil-Arvat to Kaary-Kala, Geok-tepe, Firuze, and Ashkhabad.
Tadzhikistan: Duzhambe (Stalinabad), Yanghy-Bazar, Kiafirnigan, Kulab.
Usbekistan: Tashkent, Termez.
Southern Kirghizistan: Osh, Dzhalyal Abad, Bazar Kurgan and other locations.

2nd group: Phlebotomus sergenti

Phlebotomus sergenti Parrot (including caucasicus Marz., alexandri Sinton, and mongolensis Newst.): In the sergenti-group several forms are distinguished, about whose positions as "varieties", races or independent species nothing positive can be said. It appears to be certain that the only form occurring in China, mongolensis, occurs only in high altitudes in the mountains of Tadzhikistan, while another form (probably alexandri) is more widely spread. The form caucasicus is limited to Transcaucasia, Iran, and Central Asia, while Ph. sergenti seems to be the typical form of the European - north African countries, and alexandri the form of Iraq and northern India, though all these forms have been reported from the Central Asiatic

republics as well. Their relations with one another must be carefully reexamined in order to obtain useful data on their importance as vectors of diseases.

In the principal distribution area of the form mongolensis, the Oriental boil apparently does not occur. In Tashkent, the transfer of the canine leishmaniasis on hamsters is said to be possible through the form caucasicus. In Iran, however, the distribution of the form caucasicus does not coincide with that of the Oriental boil. This is reported, on the other hand, of the typical form sergenti, but has been recently reported also of caucasicus from Transcaucasia (Georgia). In the Mediterranean region, Ph. sergenti is regarded as an important vector of Oriental boil and pappataci fever in addition to Ph. papatasii. For this reason, one must suspect temporarily all forms of the group sergenti.

Tadzhikistan: Kulyab, Duzhambe (Stalinabad), Yanghy-Bazar, Kiafirnigan.
Turkmenistan: Area of Kherkhi and Khelif, area of Chardjui, Farab, and Deinau, basin of the Tedjen and Murgab rivers (Merv, Tedjen, Serakhs, Takhta, Kushka and other locations), and the area of the Kopet-dag river (from Kizil-Arvat to Kaary-Kala, Geok-tepe, and Firuze, and Ashkhabad), Pamir: Khorog, Pish, Darmorak, Anderob, Sizd, Varmar, Barushan.
Uzbekistan: Tashkent, Bukhara, Andishan, Shakrisyabs, Samarkand, Termez, Kitab, Gusar.
Kirghizistan: (in the south Osh, Dzhalal Abad, Bazar Kurgan, Gultcha and other locations; in the north only Frunze, Alarchi, and Belovodsk).
The map shows which forms of the sergenti group have been reported from the single finding places.

3rd group: Phlebotomus major

All species and forms of this group are regarded as vectors of Kala-Azar infections.

Phlebotomus kandelakii Shchurenkova: I regard Ph. kandelakii as the most eastern representative of the important form group perniciosus which is widely

spread in the Mediterranean region. Nothing is known about the way of living and medical importance of the form kandelakii itself. In Turkmenistan it is said to be limited to altitudes lower than 300 M., in Iran, however, to mountainous regions higher than 1,500 M. This needs checking.

Turkmenistan: District Kaary-Kala, Firuze, Dzhuli, Ashkhabad, Murgab and Tedjen valleys: e.g. Tedjen, Merv, Takhta, Kushka.
Uzbekistan: Shakrisyabs.

Phlebotomus major Annandale: This species is regarded as the most important vector of Kala-Azar in the eastern Mediterranean region. It is distributed from India to the central (probably even western) Mediterranean region. Ph. wenyoni Adler, Theodor & Lourie, a species treated as independent, is probably only a race of limited distribution (only reported location known in Iran and western Turkmenistan).

Turkmenistan: District Kaary-Kala, Ashkhabad, Geok-tepe, Kushka, Kizil-Arvat, Khelif.
Uzbekistan: Tashkent, Samarkand.

Phlebotomus chinensis Newstead: The importance as a vector of Kala-Azar in northern China is regarded as proven. It is distributed from northern China to the central (and with one race perhaps to the western) Mediterranean region. In Transcaspia, it is among the important species in addition to caucasicus, the species advancing most to the north and to the highest altitudes in the mountains (see Illustration 2). The insects occurring in Russian central Asia belong to the strain "longiductus Parrot".

Turkmenistan: In the district of Kherkhi and Khelif, in the area of Chardjui, Farab, and Deinau, in the basin of the Tedjen and Murgab rivers (among others Tedjen, Serakhs, Merv, Takhta, Kushka), and in the area of the Kopet-dag river (from Kizil-Arvat to Kaary-Kal, Geok-tepe, Firuze, Ashkhabad).
Tadzhikistan: Stalinabad, Kulyab.
Uzbekistan: Bukhara, Tashkent, Kitab, Shakrisyabs, Samarkand, Andishan.

Kirghizistan: Osh, Dzhalal Abad, Gultcha and other small locations in the south, Frunze, Tokmak, and other smaller locations in the north, see Ill. 2.
Kazakstan: Alma Ata.

4th group: Phlebotomus minutus

Phlebotomus minutus and numerous other "species". As far as known until now, most species suck blood from reptiles and thus are of no considerable medical importance. It is somewhat doubtful, however, whether this most common opinion is actually true.

II. Ticks: Ixodidae

In Russian Central Asia, two species of the genus ornithodorus may be regarded as vectors of Asiatic relapsing fever: O. papillipes Birula (= tholozani Laboulbene and Megnin) and O. lahorensis Neumann; only for O. papillipes has the transfer been proven, while the data on the importance of O. lahorensis for the transfer are contradictory. Similar to bugs, the ticks live in stables, inns, caravanseries, and bite in the dark. They chiefly live on cattle, but also on rodents. The spirochaetes of relapsing fever are transferred to the following generation in the eggs. They increase within the egg, and stand the castings of the skin.

Virus reservoir are chiefly rodents, particularly those living in the neighborhood of human houses and of stables, such as mice and rats. Even the pig possibly plays some role, since ticks have been found in pigsties. The question is not yet definitively answered for the western and central Asiatic relapsing fevers.

The cases of relapsing fever reported from Russian central Asia correspond in character to the course of Persian relapsing fever (Miana). The numbers of the annually reported cases remain slight, usually below 30. The majority of the cases occurred with soldiers who had come from other regions and had been bitten by ticks in the billets.

The disease usually has a non-malignant course, no fatal cases have been reported for this region. A more serious course of disease may be expected among a population weakened by starvation and epidemics.

No data are available from this region as regards tick-typhus. The vector, Rhipicephalus sanguineus Latreille, exists in this region but no reported locations are indicated.

Synopsis of the reported locations known until now in the Transcaspian Region (according to Russian data, the figures are the same as on the map)

4 Dzhalyal Abad	15 Gusar
6 Osh	17 Stalinabad (Duzhambe)
7 Andishan	18 Shakrisyaba
8 Kokand	23 Samarkand
9 Harm	24 Nur Ata
10 Khorog	25 Bukhara
11 Sari Khasma	28 Merv
12 Kulyab	30 Murgab valley
14 Syr Darya valley	37 Ashkhabad
15 Tashkent	41 Firizkuh

With the locations mentioned the ticks reach the northern boundary of their distribution area and, at the same time, the Katu-tau mountains, 44 - 45° n.l. and 78 - 80° e.l., is the most eastern reported location in the Soviet Union known until now (not on the map). The distribution boundary according to PAVLOVSKY is indicated on the map. Of course, it is not impossible that a few foci will be found some day beyond it.

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LEISHMANIASES

IN THE TRANSCASPIAN TERRITORY

(with 2 Charts)

Translation prepared by:
U. S. Fleet, U. S. Naval Forces, Germany,
Technical Section (Medical)

Throughout Turkmenistan, in the territories south of the line Frunze - Chimkent - Bukhara - Kizil Arvat, Leishmaniasis (Kala-Azar, visceral Leishmaniasis, Leishmania donovani, and Oriental sore, dermal Leishmaniasis, L. tropica) is relatively frequent.

This kind of distribution is due to the distribution of the various forms of vegetation dependent on the climate and to the density of population of that country. Some of those areas in Turkmenistan in which Leishmaniasis does not occur are areas of a very thin or of no population (cf. map III/4). In a report by MARZINOWSKY (1934) the statement was made that dermal Leishmaniasis is to be observed in dry areas without a grass cover of the earth and with a deep level of the subsoil-water, while Kala-Azar is found near the mountains and with a level of the subsoil-water close to the surface. This observation requires a more accurate examination. The territorial distribution of the principal forms of vegetation, therefore, is simultaneously exhibited in the map.

Chart 1. Samarkand and environs
◻ Kala-Azar △ Oriental sore

Dermal Leishmaniasis shows a certain increase of its frequency in the southwestern parts of the territory, namely in the valleys of the rivers Murghab, Tedzhen, and Atrek, as well as around the towns of Ashkhabad and Merv. The medical inspection of 1,216 persons in the factories and in the schools of Merw revealed that 761 of them were or had been suffering from Oriental sore. Further places of incidence of dermal Leishmaniasis are Termez, Tashkent, Kokand, Ashkhabad, and Bukhara. According to PETERSEN in Turkmenistan the disease principally occurs during the months of December and January.

Kala-Azar usually occurs as a Leishmaniasis of infants (L. infantum) (as f.i. in Samarkand). Throughout the territory of Turkmenistan, however, it also involves the adults. Various Russian scientists emphasize the fact that in Turkmenistan visceral Leishmaniasis is found with the adults as well, "a matter to be made known to the general public" (1925).

In Bukhara and in the southern part of the Amu-Darya several cases of Oriental sore and of visceral Leishmaniasis were observed. Small foci and isolated cases, however, occur throughout the entire area of southeast Turkmenistan, and they were particularly observed along the track of the Central Asiatic Railroad (see Chart II).

Chart II. Kokand - Andishan
□ Kala-Azar △ Oriental sore

The frequency of Leishmaniasis apparently varies extraordinarily, and throughout the Transcaspian territory the number of cases is much smaller than in India.

While in 1925 180,000 cases were recorded in Bengal, only few hundred cases were found in Central Asia during the same year. As it was emphasized elsewhere in the Atlas of Epidemiology (see comment to map II/5), in the regions where so far only isolated cases of Leishmaniasis were observed, more accurate and close investigations were sufficient to reveal a frequent occurrence of these diseases. The average number of Kala-Azar in the new city of Tashkent f.i. amounted to 25 cases of Leishmaniasis per year (1923). The observation could, however, be made

that this group of diseases was slowly spread, and in 1928 to 1930 two new foci appeared in the center of the city. Samarkand with 4 % of all children in the age between 2 and 3 years suffering from Leishmaniasis has the highest incidence. It is followed by Kokand and Tashkent. 95 % of the sick persons range within the age groups between 0 and 16 years.

The canine Leishmaniasis is worth particular consideration, as it has not yet been possible to exclude it as a source of infection which at least applies to the Kala-Azar of the children. Some of the Russian scientists hold that the dogs " most likely are the real virus carriers of the human Leishmaniasis ". There were reports particularly from Tashkent and Ashkhabad that a great number of dogs in these towns were contaminated with Leishmania. There are even statements of some scientists which indicate that the entire country of Turkmenistan is populated with infected dogs. As a result of these conditions the complete extermination of the dogs was recommended as an efficient measure for the elimination of Leishmaniasis. In 1913 Leishmaniae were found in about 25 % of the dogs. In 1926, however, only 2.2 % of the dogs were contaminated. A similar frequency of disease was observed in the dogs in Ashkhabad. The examination of the entire dog population numbering 3,385 dogs revealed that 97 of them, equal to 2.86 %, were contaminated with Leishmaniasis (1935).

The largest number of patients is found during the spring and summer months, while the minimum is observed in November. Contrary to that, Kala-Azar of children attains its maximum during the fall and winter months which corresponds to the summertime maximum of the Leishmaniasis of the dogs, if one considers that the incubation period of the children is 1½ to 3 months.

One regards the sand flies of the species phlebotomus as the vectors of Leishmaniasis. The phlebotomi of the sergenti-group are considered as the transmitters of the Oriental sore, those of the major-group as the vectors of the visceral Leishmaniasis.

Complete information on the distribution of Leishmaniasis throughout the Transcaspian territory for the time being is very difficult to compile so that it is likely that this study requires a number of complementary data.

G. PIEKARSKI

DENSITY OF POPULATION IN THE TRANSCASPIC AREA.

(with 1 map in the text).

Translation prepared by:
U. S. Fleet, U. S. Naval Forces, Germany,
Technical Section (Medical).

In addition to the presentation of the "density of the population in the Near and Middle East", the map of the density of population of the Transcaspian area, which was elaborated according to the same points of view gives an idea of the concentrations of the population of this area of the Middle-East, which is undergoing intensive transformations. The considerably enlarged scale as well as extensive sources facilitated a more precise presentation and a correction of the corresponding part of the map II/9.

The 8 smaller Federal Republics of the USSR are, as the southern frontier of the Russian Empire, formations of special dynamics. Georgia, Azerbaidzhan and Armenia are within the Transcaucasian area while the Republic Daghestan and the autonomous republic of the Kalmyk north of the Caucasus are in a certain special position. The Transcaspian area from the lower Volga to the Chinese border is the area of the Republic Kazak, whose southern and eastern parts together with Turkmen, Uzbek, Tadzhik, and Kirghiz fill the Turkestan area. Today (1945), the influence of the Soviet Union extends farther eastwards to the area of east Turkestan (former Chinese province Sinkiang) and outer Mongolia.

The Transcaucasian, as well as the Turkestan area distinguished themselves by a considerably larger increase of their population, as can be seen by comparing the results of the Russian Census of 1926 and 1939, which showed an increase of the population of the Soviet Union of 15.9 %.

Federal Republic	Total population 1926	1939	Increase of population in per cent
Georgia	2,677,000	3,542,000	32.3
Azerbaidzhan	2,314,000	3,210,000	38.7
Armenia	881,000	1,282,000	45.4
Turkmen	998,000	1,254,000	25.6
Uzbek	4,566,000	6,282,000	37.6
Tadzhik	1,032,000	1,485,000	43.9
Kirghiz	1,002,000	1,459,000	45.7

The distribution of the population in Russia is very disproportionate. South of the 55° northern latitude in Siberia, 92.6 % of her population are living on only 27.4 % of her surface. The distribution of the population of middle Asia is similarly dis-

proportionate. In the area of the fertile black-earth of the northern part of Kazak, the population is equally dense as in the southern area of Siberia. Its desert-zones and plains are sparsely populated, while the ancient cradle of mankind, Turkestan, in its areas of fertile loess along the foot of the mountains has oasis-like, densely populated cultured areas.

"South of Orenburg the plains begin - there is Asia". Even in the 19th century the Empire of the Tsars safeguarded itself against an invasion of the steppe Kirghizes by a protecting rampart of Cossacks consisting of peasant-soldiers. The villages of the Cossacks on the western bank of the Ural as well as on the eastern bank of the Irtysh formed for a long time, together with the Cossacks-line (Orenburg - Orsk, Troitsk, Petropavlovsk, Omsk) the border of the Russian Empire. Today the Russian farmer has spread over the steppe.

Kazak (Kasakstan) with its extent of 2,958,800 sq.Km. is the second largest federal republic of Russia. Its average density of population is low because of the extensive desert-and plain-areas; the ratio is 2.2 inhabitants for every square kilometer. As regards Siberian conditions, however, the country with its 6,570,500 inhabitants is still well populated. The number of Casac-Kirghizes, a nomadic tribe, predominantly engaged in raising cattle, is registering a remarkable declination in number because of their removal from the steppe. 1897: 4,285.698; 1926: 3,968,289; 1939: 3,098,764; in the last twelve years alone their number decreased by 21.9 % and now they represent only 57.1 % of the total population. The Russians (19.7 %) and Ukrainians (13.2 %) are mostly farmers in the fertile northern border-areas, 44,283 Germans in 128 settlements have been counted amongst them. The Uzbeks (3.3%) live in the southern part, the Kara Kalpak (1.8 %) in the delta of the Amu-Darya and south of the desert Kyzyl Kum (1926: 146,317; 1939: 185,775); there they have an autonomous area which belongs to Kazak. The remaining 4.9 % are divided in several smaller tribes, like the Tarantshs, 6,000 families of which the Russians transferred as welcome settlers in 1730 from Chinese-Turkestan to the Ili-valley; in 1882 they amounted to 36,000 families in Semirentshensk alone and were said to be 53,010 families in 1926; furthermore the Dunganes in the extreme northeast of Turkestan and others.

Kazak is a country rich in raw-materials and natural resources (treasures of the soil), inspite of the extensive, dry Kirghiz-steppe, the salty Kaspi-lowlands, the dreary Ust-Urtplateau of the desert Kyzyl-Kum and the famine-steppe. In the north it shares the fertile

black-earth zone, attached to which are chestnut-brown soils suitable for farming; irrigation is the decisive factor everywhere. The mining-districts are numerous too, located in the northeast, like the rich mineral coal areas of Karagandinsk and Spask; as well as the gold, iron, and manganese - deposits in the seven-river-land of Semipalatinsk, which were made accessible by the construction of new railroads. Karaganda, still unknown in 1926, reported 165,900 inhabitants in 1939. Alma Ata, which was established as a fort by the Russians in 1859, and which in 1863 had only one brick- and 766 wooden buildings, grew from 1926 with 45,400 inhabitants to 230,000 inhabitants in 1939, i.e. 507 %.

proportion of	City - population	Country-
1926	8.5 %	91.5 %
1939	27.5 %	72.5 %

The mining and industrial development is expressed in the considerable increase of the city-population.

Turkmen (Turkmenistan) with an extent of 443.600 sq.Km. was formed out of the former province Turkestan, parts of Bukhara and Chiva. The average density of the population is low (2.8 inhabitants) on account of the extensive Kara Kum - Black Desert - . The Turkmens, who offered the last brave opposition against Russian conquest - the Russians conquered it only in 1881 - form with 70.2 % (1926) the major part of the population. They too increasingly change over to agriculture from the nomadic life. The Uzbeks represent 11.7 %, the Russians 9.1 %, the Armenians 1.5 %, Kirghizes 0.7 % of the population. The remainder with 6.8 % are Persians, Jews of Bukhara and others.

Considerable parts of the Turkmenish population fled to Iran and Afghanistan during the sanguinary suppression of the rebellions which occurred in Middle Asia in 1916; the strong natural growth as a result of modern hygiene and the declination of the mortality rate is therefore noteworthy.

The capital Ashkhabad with its more than 100,000 inhabitants has almost reached the number of inhabitants of the old Persian Meshed. The increase of the city-population is strikingly high compared to the small number of cities.

Density of Population in Kasakia and Turkestan.

	proportion of city -	country-population.
1926	13.7 %	86.3 %
1939	33.2 %	66.8 %

This might depend on counting a large part of the population, living densely in the oasis - Merv has over 400,000 - as city-population.

Uzbek (Usbekistan) with an extent of 378,300 square kilometers was formed in 1922 from the Province Syr-Darya and the nuclear-area of Bukhara; it has the largest density of population with 16,6 inhabitants for each sq.km. The Uzbeks (Sarts) not only represent 65 % of the population, but are on the other hand a most capable race of men and are leading in their native state as well as in the whole area of Turkestan, as regards culturing of oasis, trade and commerce. In 1926, the Tadzhiks represented 19 %, Casac-Kirghizes 3 % and others 8 % of the total population. The Ferghana-basin with considerable mining industry and cotton plantations is part of Uzbek. It has a density of population of 100 - 150 inhabitants. Another part of Uzbek are the extensive oasis areas in the river valleys of the Zaravshan and Tshirtshnik with 50 - 100 inhabitants per sq.km. There are "villages" with 10,000 to 15,000 inhabitants. The densely populated oasis Chiva-Chovesma with an extent of 7,600 sq.km. represents an exclave which belongs to Uzbek too. The capital Tashkent, which in 1897 had 155,673 inhabitants, in 1912, 272,000inhabitants and now 600,000 inhabitants, is now larger than Teheran. Because of its coal and naphtha this oldest center of trade is nowadays the center of the iron consuming industry with large tractor factories.

	proportion of city -	country population
1926	22.2 %	77.8 %
1939	23.0 %	77.0 %

In spite of an increase of 37.6 % of the total population at this time, the proportion city - country in Uzbek has scarcely changed contrary to nearly all the other areas of Russia. This is a consequence of gaining new areas for settlement, to which we will refer later.

Tadzhik (Tadshikistan). The up to then "autonomous" republic was changed into a federal republic in 1929, and was enlarged by the district of Khodshent, which was taken from the Province Uzbek. This was preceded by a transfer of the Tadzhiks from the area of Kokand and Ferghana to the southern border, the upper course of the Amu Darya and its by-valleys, which were especially suitable for cotton cultivation; in 1928 the areas for cotton cultivation could be increased here from 70,000 to 200,000 hectare. The Tadzhiks are the descendants of an old Aryan population of Middle Asia, they are farmers, in the hills also cattle-raisers, which had been supplanted into the mountain-valleys by the Uzbeks. As regards religion, they were Schiiten (Shiits). Politically this created a counter-weight to the Uzbek (oes-beg - autocracy) who are leading not only in the central Asiatic trade, but also in the conservative Mohammedanism (Sunnits), and at the same time this secured the southern border against the Afghans. The area of this state, which had an extent of 143,900 sq. km. includes the "Roof of the Earth", the Pamir-plateau with the autonomous area of Berg-Badachshan (35,700 inhabitants to 0.3 sq.km.). Inspite of this the average density of the population is 10.3 inhabitants per square kilometer.

Proportion of the	city-	country-population
1926	10.3 %	89.7 %
1939	17.0 %	83.0 %

In addition to Khodshent the center of industry, which was founded by Alexander the Great at the entrance to the Ferghana-basin, Stalinabad as the capital plays the most important part. The little village Djushambe with 5,600 inhabitants in 1926, developed into a town of 82,500 inhabitants in 1939, this means an increase of 1472 %. With more than 90,000 inhabitants it now reaches the number of inhabitants of the Afghan town Herat and is not far below Kabul. The formerly great danger of malaria in this area was eliminated by a systematic sanitation.

Kirghiz (Kirghisistan). This last federal republic with an extent of 196,700 sq.km. has an average density of population of 7.4 inhabitants per square kilometer. The country is poor. The mountains in the direction east-west have Alpine climate, farming is possible only in the lowest valleys, while in the remaining parts pasturage is predominant.

The Kara-Kirghizes represent 67 % of the population, Russians 12 %, Uzbeks 11 %, Ukrainians 6 % and the remaining 4 % are others. The Uzbeks live predominantly in cities, the Russians as settlers in the fertile spurs of the mountains around the capital Frunze. With Osh, the state participates in the mining area of Ferghana.

Proportion of	city - population	country
1926	12.2 %	87.8 %
1939	18.5 %	81.5 %

The recruiting of a larger number of people to build earthworks along the western front of Russia - until in 1917, 180,000 are said to have been recruited- and the sanguinary rebellions induced the Kirghizes to change over to China into the area of Cashgar and Culdsha. During this time the cattle-raising was reduced by 75-80 %, and the area under cultivation decreased by 60 %. Presently Kirghiz has the strongest increase of population - 45.7 % in 12 years!

Development of population: While, with few exceptions, the country population declined in the Russian, especially the Ukrainian territories and also in Siberia, in Turkestan a strong, natural increase of population can be observed. The increase of population in the Turkestan area amounted from about 9 millions in 1926 to about 13 millions in 1939 (10.5 millions in the four federal republics and 2.5 millions in the southern part of Kazak) that is about 4 millions. These additional 4 millions could not all find employment with the industry, therefore an extension of settlements with the utilization of all water supplies and technical possibilities was necessary. A manifesto, issued on 22 December 1939 by the government of the Soviet Union demanded that the new formation of irrigation territories be the community task of Turkestan. It was planned from 1940 to the end of 1945:

	New formation of irrigation areas hectars	new collective farming establishments:
Uzbek	430,000	58,600
Turkmen	104,000	15,000
Tadzhik	113,700	13,000
Kazak	425,000	42,000
	1,073,200	128,600

With an average of 5 heads per establishment this means a new employment of about 640,000 people which is about 7 - 8 % of the total population. The major principle was to resettle the nomads and carry out a resettlement from the hills into the steppe. Within the years of 1938 - 1939 the cultivation of Uzbek was enlarged by 160,000 hectare. A comparison of the existing cultivated areas with the areas to be cultivated shows in 1000 hectars:

	Cultivated areas 1937		Areas cultivated 1940 - 1945	
	Total	cotton	total	cotton
Uzbek	2653	906	430	100
Turkmen	394	155	104	25
Tadzhik	787	111	114	39
Kazak	5831	111	425	65

These data of the Gosplanizdat are interesting in that they show that they have learned from the famine in 1930-1932, which was mainly caused by the planting of cotton, and as a result of this now strive for an economic as well as a nutritional self-sufficiency of the various territories based on traffic- and military-geographical interests. With these areas to be cultivated, the plantation areas for grain will be extended by 30 - 40 %. During the summer of 1939 the construction of the large Ferghana-irrigation-channel (more than 350 kilometers long, width of the water-level 20 meters, raising 100 cbm/sec.) was started and finished as a community task of 160,000 Uzbek men and women. Only resettlers of the local population will get the territory thus gained. Thus, the healthy growth of this group of people merging now inwardly with the Russian Empire is secured.

Under the influence of the centrally directed development of the southern border-republics of the USSR, a far-reaching change of the middle-Asiatic territory is developing. A considerable increase of the space for living and earning ones livelihood was the result of an improved status of communications and economics; with a simultaneously strong, natural pressure of population. This conglomeration of people will not be without influence on the neighboring countries.

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